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THE VALUE OF THE FAECAL EGG COUNT IN SHEEP

BY

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Faecal egg count is probably the most generally used method of estimating the size of the worm burden in sheep. As an index of the number of worms present in the animal it is important that the method should give as accurate a picture as possible.

It has been known for some time that egg counts should be interpreted with caution, and that the number of worms indicated by a given count varies with the age of animal, the species of worm involved, the time of year and the consistency of the faeces. Other factors also affect the count but the most important appears to be an unpredictable variation in the egg content of faeces passed in the course of a single day and from one day to another. Such variations have been noted in cattle faeces (Messerli, 1950; Roberts, O'Sullivan & Riek, 1951) and in the egg output of *Strongylus spp.* in the horse (Britton, 1938). Gordon (1950), dealing with sheep, concluded that "considerable variations occurred from hour to hour and from day to day."

Spedding (1952a), presenting the results of a study of "within-day" variations, found that a count of 3,024 eggs-per-gramme (e.p.g.) occurred in one sheep, the faeces of which contained 773 e.p.g. three hours previously. In a further study Spedding (1952b) showed that counts of 45 e.p.g. and 3,104 e.p.g. could occur within a 30-hour period in the faeces passed by the same sheep. Collecting faeces every two or three hours and carrying out duplicate egg counts on each sample gave a fairly reliable average e.p.g. count and also a total eggs-per-day (e.p.d.) count for any given day. Using this method it became evident that large variations occurred from day to day and indicated that when a random faecal sample is taken from a sheep the resulting egg count probably bears little relation to actual worm burden.

The problem therefore arises as to the means of eliminating errors due to these variations without taking numerous separate samples over a period of at least 24 hours. At the Grassland Research Station a considerable degree of success has been achieved using an electrically driven mixer fitted with two inter-acting, four-blade beaters. Initial tests showed that if several samples of faeces from different sheep were mixed the resulting egg counts were close to the expected average. The results of an actual test are given in Table I.

Further samples were then mixed, some of which contained *Nematodirus* and/or tapeworm eggs and some of which did not. The counts on the mixture showed a fairly uniform distribution of these eggs.

The egg counting was carried out using a zinc sulphate/centrifuge technique, but whatever the counting method it is important that its reproducibility should be satisfactory. A given egg count may indicate several different worm-population sizes according to the several factors involved—time of year, etc. The most important feature of any egg counting method is that it should give constant results, even if these do not indicate the absolute number of eggs in the unit of faeces used. In order to ascertain the suitability of the electrical mixer in this respect a trial was carried out using four sheep over a 24-hour period. The faeces from these sheep were collected and sampled for egg counting every three hours. The total faecal output of each sheep was then mixed and the final mixture sub-sampled for egg counting in triplicate. In this way it was possible to calculate from the three-hourly counts and faecal weights the theoretical average e.p.g. of the mixture and compare it with the actual average obtained by the final egg counting. These data are shown in Table II, together with the maximum and minimum counts obtained during the 24-hour period. Complete data for one sheep are presented in Table III.

It will be noted from Table II that reproducibility of counts was satisfactory on the mixture from each sheep and that in three cases the final count was close enough to the theoretical average to be taken as the true count. In one animal, however (Sheep No. 4), the final count was much higher. Since none of the three-hourly counts was very high and none of the final counts low, the only explanation seemed to be an incomplete release of the eggs

TABLE I

EGG COUNT DATA FROM A TEST ON THE MECHANICAL MIXER

Sample number	E.p.g. counts	E.p.g. mean	Weight of sample grammes	Total number of eggs in sample	Theoretical mean e.p.g. count of mixture	Actual e.p.g. counts on mixture	Mean
1.	38 32 45	38	680	25,840			
						66 65	
2.	131 120 129	126	65	81,900	75	62 57 61 71	64
3.	3 2 3	3	105	315			

TABLE II
AVERAGE EGG COUNTS OF FOUR SHEEP OVER A 24-HOUR PERIOD

Sheep No.	E.p.g. theoretical average	Maximum e.p.g. during 24-hour period	Minimum e.p.g.	E.p.g. counts on mixture	Mean e.p.g. of mixture
1	126	216	24	137 105 101	114
2	1,058	2,730	392	1,418 1,260 1,501	1,332
3	80	154	7	110 83 74	89
4	458	1,066	71	1,191 1,036 905	1,044

ing experiment was carried out to obtain more information concerning the daily fluctuations in egg output, and particularly to study any repeated pattern of variation.

The total faecal output was collected daily over a period of seven days from three shearling sheep and mixed, after the addition of a known volume of water, usually 200 ml. This addition of water was found desirable, but not essential, owing to the dry, pelleted nature of the faeces. The mixtures were sampled for egg counting each day, the counts being carried out in duplicate. The mixer was further tested, with a view to obtaining a direct average count over a period of seven days or more. Each day 100 grammes of the mixture from each animal were stored in a refrigerator at 4° C. At the end of the period the sampling was complete, but the faeces were kept at 4° C. for a further 14 days to give some indication as to whether a period longer than seven days could be treated in this way. The seven samples from each sheep were then bulked and mixed, after the addition of 100 ml. of water. Egg counts were carried out in triplicate on each final mixture.

TABLE III
EXPERIMENTAL DATA FOR SHEEP NO. 2 OVER A 24-HOUR PERIOD

Collection period	1 9 a.m.	2 12 noon	3 3 p.m.	4 6 p.m.	5 9 p.m.	6 12 midnight	7 3 a.m.	8 6 a.m.
Faecal weight, grammes	315	147	143	101	53	37	153	Nil
E.p.g.	579 271	360 424	1,256 1,351	2,804 2,655	1,745 1,742	1,095 957	1,423 1,502	— —
Mean e.p.g. ...	425	392	1,304	2,730	1,744	1,026	1,463	—
E.p.d.	133,875	57,624	186,472	25,730	92,432	37,962	223,839	—

present during the first counts. It appeared likely that the final macerated mixture had the additional advantage that it broke up faeces of a consistency not readily dealt with by the usual methods of shaking with glass beads, etc.

The mechanical mixer, therefore, appeared to reduce markedly, if not to eliminate, the errors consequent upon "within-day" variations. Where required, a reasonably accurate e.p.d. count could be obtained, provided that the total faecal output for a day was collected.

It is further necessary, however, to ascertain what value may be placed upon a single e.p.d. count, and for this it is necessary for day-to-day variations to be known. Previous work (Spedding, 1952b) had shown a considerable day-to-day variation, using three sheep, and indicated that egg output might conform to a certain pattern. The general rhythm of output occupied a period of three days from one peak to another. The use of the mixer made it possible to follow the daily variations in egg output without resort to the great number of counts previously required. The following experiment was carried out to obtain more information concerning the daily fluctuations in egg output, and particularly to study any repeated pattern of variation.

The daily e.p.g. counts are shown in Table IV with the average e.p.g. figures for the seven-day period.

In Table V are given the final counts and the seven-day averages based on them.

TABLE V
EGG COUNTS ON FINAL MIXTURE

Sheep No.	E.p.g. counts on mixture	Mean e.p.g.	Average e.p.g. for the seven-day period, after adjustment for water added before mixing
A.	624 611 584	606	693
B.	1,460 1,273 1,354	1,362	1,557
C.	177 238 163	193	221

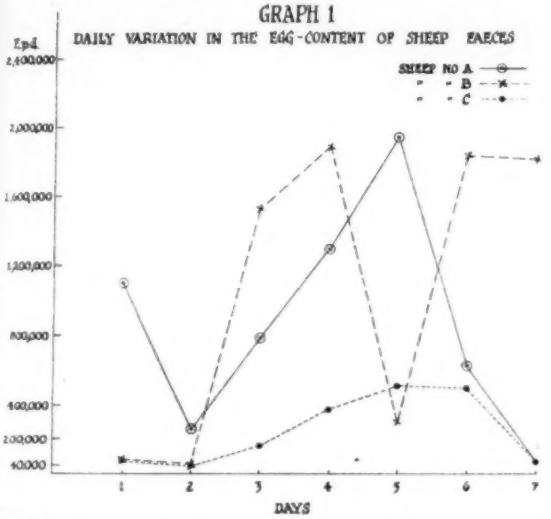
TABLE IV
EGG COUNTS OF THREE SHEEP OVER A SEVEN-DAY PERIOD

Sheep number	Day 1	2	3	4	5	6	7	Average for seven days
A.	1,178	359	768	1,479	1,890	1,038	85	971
B.	66	24	2,154	2,025	405	2,411	2,200	1,326
C.	83	49	173	349	436	414	68	225

Reproducibility was reasonably satisfactory and the weekly average obtained using the mixer appeared to be a far superior index to the general level of egg output for a given animal than any single day. In fact, it gave a figure bearing close similarity to that derived from the average of the daily counts.

The true daily variation, however, can be ascertained only from the e.p.d. counts (Graph 1). It is evident, from a

GRAPH 1



consideration of these counts, that variation from day to day was considerable, and would reduce the value of any single e.p.d. count. Although the fluctuations rose and fell with some regularity, it was not possible, from these data, to state a minimum number of daily samples which would provide an accurate average.

The rhythm differed sufficiently between sheep and from the results of previous work to indicate that, unless conditions were similar, such a rhythm is not predictable. In the experiment described the peak-to-peak period was approximately three days in Sheep B, but Sheep A and C both followed a similar pattern over a much longer period.

The final seven-day mixture suffered from the disadvantage of providing an e.p.g. count. This could be improved by taking an aliquot sample each day (*e.g.*, 10 per cent. of the daily total) instead of the standard 100 grammes used in this instance. The final e.p.g. count multiplied by the total weight of faeces for the period and divided by the number of days would then give an average e.p.d. count of equal value to that derived from daily counts. In this way the variations in egg output would be eliminated and an egg count obtained that represented the average rate of egg production by the worm population present in the animal during the period under consideration. For such studies as the effect of parasitism on digestive efficiency this average e.p.d. figure for the period of the trial would be the most valuable. The expression of an egg count on this basis would also be helpful in assessing the value of the egg count as an index of worm-burden size.

Summary

The series of observations described in this paper indicate that the day-to-day variations in the output of trichostrongylid eggs by parasitised sheep cannot be explained by the quantitative output of faeces, nor by inaccuracies due to the technique of counting. Variation in the rate of egg production by the worm population appears to be the only explanation.

Where the technique of egg counting is used to detect slight variations in the level of infestation it is necessary to collect all the faeces passed in 24 hours, to mix them and to examine a sample from the mixture. A suitable method is described involving the use of a mechanical mixer.

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INVESTIGATIONS CONCERNING THE FEEDING OF CHICKENS WITH RATIN IN RELATION TO THE B.W.D. TEST

BY

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The purpose of these experiments was to ascertain if the distribution of Ratin baits on poultry farms would produce in hens that had access to such baits, antibodies that interfered with the reactions to the routine B.W.D. test.

As the *S. enteritidis* group, to which *S. enteritidis* var. *danysz* belongs, is of the same O-antigen structure—IX, XII_1, XII_2, XII_3 (in this connection possible quantitative differences in the contents of the various factors are ignored)—as *S. pullorum* and *S. gallinarum*, it is reasonable to assume that the Ratin bacterium would behave serologically in the same way as *S. pullorum*.

Bahr and Christensen (1936) fed chickens and hens with a highly virulent Ratin culture, but were unable to show the presence of antibodies in the blood (lowest dilution for chickens 1 : 25, for hens 1 : 40). It is well known, however, that in chickens and young animals with a latent infection following an earlier attack of pullorum disease, it is not usually possible to demonstrate the presence of antibodies in the blood in any appreciable amount until the animals are about six months old. (For this reason it was decided that the experiments should be carried out with fully grown, laying hens.)

Experiment No. 1 (Holland)

On August 6th, 1949, 24 four months' old hens, reared on a farm free from pullorum infection for many years, were placed in a yard where no pullorum-infected birds had ever been kept.

For the examination of the blood the following antigens were used :—

(1) Stained antigen from Weybridge, made from a pullorum strain (standard) ;

(2) Stained antigen from Lederle (New York) made from standard and variant strains of *S. pullorum*, and

(3) Antigen from the Rijksserum Inrichting, Rotterdam, containing a standard and variant strain. Each blood sample was tested with the three antigens and a tube test was done for control purposes. Before they were infected with Ratin culture the blood samples of all hens were examined on three occasions with all the antigens mentioned (*i.e.*, on August 6th, September 15th and October 21st).

One hen died on September 22nd from peritonitis by egg rupture (probably caused by trauma) but the bacteriological test was negative; another hen suffering from tracheitis was killed (November 5th) and bacteriological examination for salmonella bacteria gave negative results.

On October 21st, when the three blood tests undertaken had proved that the hens showed no reaction to the antigens employed, the 22 hens were divided into three groups of seven, seven and eight hens respectively. Each hen was given the doses mentioned below, the culture being administered by a catheter into the crop.

Group I, seven hens, each received 10 ml. of Ratin culture.
Group II, seven hens, each received 20 ml. of Ratin culture.
Group III, eight hens, each received 30 ml. of Ratin culture.

The results of the experiments given in Table I show that at the rapid whole blood examination on November 14th, two hens (Nos. 15 and 17) gave a fine granular reaction (±). At the serum tube test examination, no hens gave agglutination in a dilution of 1 : 20. Six hens had stopped laying eggs on account of moulting (among them were Nos. 15 and 17) but the rest were still in production.

At the blood test on December 1st, one hen (No. 20) showed a positive reaction (+), two other hens (Nos. 6 and 24) showed weak reactions (±). At the tube test hen No. 20 showed agglutination in a dilution 1 : 80, whilst hens Nos. 6 and 24 reacted at 1 : 40. The rest were negative.

Blood tests carried out later on December 19th and January 20th all gave negative results.

TABLE I
WHOLE BLOOD TEST. STAINED ANTIGEN

Date of the blood test	Hen No.	From			
		Weybridge	Lederle	Rijksserum Inrichting	Tube test
Nov. 14th	15	±	±	±	–
	17	±	±	±	–
	The rest	–	–	–	–
Dec. 1st	6	±	±	±	1 : 40
	20	+	+	+	1 : 80
	24	±	±	±	1 : 40
	The rest	–	–	–	–
December 19th and January 20th all hens negative					

++, +, ± = different strengths of agglutinations. – = negative.

Salmonella infections of poultry often show that certain salmonella types (for instance *S. pullorum*, *S. gallinarum* and *S. typhi murium*) settle in various organs, most frequently in the ovary, gall-bladder and intestines, for which reason it is possible that infection via eggs may take place.

In order to see if a similar possibility existed in the case of Ratin bacterium, a cock (which had at several blood tests reacted negatively to pullorum disease) was placed with the hens. A large number of eggs were, at various times, placed in an incubator, and examined bacteriologically after different periods of brooding. Embryos which had died were also investigated but neither *S. enteritidis* var. *danysz* nor any other salmonella was found.

EXPERIMENT NO. 2 (DENMARK)

On August 3rd, 1949, 24 young hens, about five and a half months old (crosses between White Leghorns and Light Sussex), were bought for the experiment from an approved hatchery, which had been free of pullorum disease for 10 years. The hens were placed in a room which had previously been carefully cleaned and disinfected.

For the examination of the blood, stained antigen from Weybridge, made from a pullorum strain (standard), and stained antigen from Lederle (New York) made from three standard and two variant strains, were used; whole blood tests were made with these two antigens but in addition tube tests were made with four antigens (alcohol treated).

Before the hens were infected blood samples were examined twice (on August 19th and August 31st, 1949) with all the antigens mentioned in order to be sure that none of them showed non-specific reactions which might influence the results of the experiments.

On September 5th, at a time when practically all the hens had started egg-laying, they were divided into three groups of eight hens, from which each hen of group I received 10 ml., of group II 20 ml., and of group III 30 ml. of a 20-hour Ratin culture which was administered with a catheter into the crop.

The general condition of all the hens was not affected by the culture, neither was there any decrease in egg-laying.

From Table II, where all results of the blood tests at different periods are given, it appears that two hens (Nos. 162 and 164) showed a reaction of 1 : 80 to *S. gallinarum* (st. 650/48). Hen No. 176 reacted at 1 : 40, whereas two

TABLE II
TUBE TEST AGGLUTINATION

Time of examination of blood	Hen No.	*S. gallinarum* st. 650/48	*S. pullorum* var. st. 31720	*S. pullorum* England	*S. enteritidis* var. *danysz*	Whole blood test stained antigen from	
						Weybridge	Lederle
September 20th	162	–	–	–	–	–	±†
	164	1 : 80	1 : 40	1 : 40+	1 : 20+	–	±
	158	1 : 40+*	1 : 20+	1 : 20+	1 : 20+	–	–
	176	1 : 40	1 : 10	1 : 10±	1 : 20+	–	–
	166	1 : 20+	1 : 20+	–	–	–	±
	154	1 : 20	–	–	–	–	±
October 5th	162	1 : 80	–	1 : 40+	–	+	+
	164	1 : 40	1 : 20	1 : 40+	–	±	+
	150	1 : 40+	–	1 : 20	1 : 10+	–	–
October 25th	162	1 : 40±	–	–	–	±	±
November 14th and December 5th all negative							

* + = Partial reaction. ± = Traces. – = Negative reaction.
† ++ = Strong agglutination. + = Distinct agglutination. ± = Weak agglutination. – = Negative agglutination.

other hens (Nos. 158 and 150) showed partial reactions at 1 : 40 with the same antigen.

Antigens made from *S. pullorum* (st. 31720 U.S.A.) and *S. pullorum* (England) showed only a few relatively weak reactions, at most 1 : 40 (hens Nos. 162 and 164).

With the homologous strain, *S. enteritidis* var. *danysz*, there were only a few very weak reactions, a fact that it is difficult to explain, but this is probably due to quantitative differences in the antigenic structure of the strains used.

All reactions of 1 : 20 and less ought to be considered unimportant in this connection, as such weak reactions are often associated with poultry where pullorum disease has not been known for many years.

With regard to the whole blood test, it should be noted that most of the reactions shown were weak and soon disappeared.

It will be seen that two hens (Nos. 162 and 164) showed positive reaction (+) in the blood test on October 5th, 1949, whereas in the examination on September 20th and October 25th they showed weak reactions (±).

Two other hens (Nos. 166 and 154) showed weak reactions (±) on September 20th, but only with antigen from Lederle.

The relatively higher titre values which have been obtained with *S. gallinarum* presumably are due to a greater agglutinability as compared with the other antigens employed. It must also be noticed that only hens which received 20 or 30 ml. Ratin have shown distinct, positive reactions. In addition to the blood test a bacteriological examination was made of the majority of the eggs laid during the experiment.

From September 5th till November 31st, 1949, the hens laid 1,622 eggs, of which 400 (about 24·65 per cent.) were examined. The examination of these eggs was made at regular intervals during the period mentioned. Both shell and yolk of the eggs were examined bacteriologically by the following method. The shell having been divided into two halves and the white having been removed (the yolk remaining in one half of the shell), part of the pellicle of the yolk was sterilised with a glowing spatula, and about 2 ml. of the yolk mass were taken out by means of a sterile pipette and placed in a sterile test tube. The pellicle of the other half of the shell was removed, after which the shell was broken into small pieces by means of a pair of tweezers and put into a test tube ; 10 to 15 ml. "Anreicherung-Substrate" (sodium-tetrationate bouillon or sodium-biselenite) were added to both tubes, which were placed in an incubator for 20 hours at 37° C. and then examined for colonies of salmonella.

S. enteritidis var. *danysz* was isolated from the shell of one egg only, which was laid on the floor on September 22nd. In no case was salmonella isolated from the yolk. Probably the above-mentioned egg was infected on the floor and not during the egg-laying, as no bacteria were isolated from the shells during the first fortnight after the inoculation, during which period the chances of faecal contamination were much greater.

At the end of the experiment (December 22nd, 1949) all hens were killed and the following organs were examined bacteriologically : liver, spleen, gall-bladder, ovary (two or more follicles), oviduct and intestine (duodenum, jejunum, caecum). Samples from the organs mentioned were put into test tubes with sodium-biselenite and placed in the incubator, after which subculture on brilliant green agar was made in the usual way.

In no case was *S. enteritidis* var. *danysz* isolated.

Discussion

It has been shown that certain types of salmonella (*e.g.*, *S. typhi murium*) occasionally can cause a false reaction at the B.W.D. test (Wilson, 1947 ; Hansen, 1942). Experimental serological studies of *S. typhi murium* carried out by one of the writers, Marthedal (1951), have confirmed the observations made in practice.

It must also be mentioned that salmonella strains belonging to the *S. enteritidis* (Gärtner) group are less commonly found in hens, as compared with *S. typhi murium*. In England, Buxton (1948) found *S. enteritidis* 17 times in chickens during the period 1939-47. From 1936 to 1948, *S. enteritidis* (jena type) was isolated only twice from chickens in Denmark (Karlshøj & Marthedal, 1949).

In Denmark, large quantities of the Ratin culture are distributed widely over the country every year. If the Ratin bacteria were pathogenic to poultry even to a small degree, it is most likely that cases of salmonellosis in poultry would occur at frequent intervals, but so far, at the routine bacteriological examinations carried out in the poultry research laboratory, the Ratin bacterium has not been isolated. It would appear from the two experiments conducted that it is possible under certain conditions for *S. enteritidis* var. *danysz* to cause a positive reaction at the B.W.D. test, but the reactions are generally weak and disappear after two months at most.

Summary

The experiments carried out aimed at determining whether hens infected with the Ratin bacterium (*S. enteritidis* var. *danysz*) would produce antibodies which might, at the blood test for pullorum disease, interfere with the interpretation of the B.W.D. test. In order to investigate this possibility, 46 adult hens were infected *per os* with a broth culture of *S. enteritidis* var. *danysz*. All blood samples from the animals used for the experiment were examined by whole blood test as well as by tube test. It appears from the experiments that some hens produce antibodies which show a positive reaction at blood tests with both *S. pullorum* and *S. gallinarum* antigens. At whole blood test two hens showed a distinct reaction (+), while seven other hens showed weak reactions (±). At tube test three hens showed reaction in dilution 1 : 80, three other hens reacted totally at 1 : 40, while two hens showed a partial reaction at 1 : 40.

It is pointed out that other salmonella bacteria, especially *S. typhi murium*, might have produced similar reactions.

S. enteritidis var. *danysz* appears to have little pathogenic effect on the poultry of Denmark and as it causes only slight formation of antibodies which are relatively quickly eliminated (six to eight weeks), it should be easy to avoid these reactions completely by omitting distribution of Ratin on poultry farms two to three months before the hens are to be blood-tested for pullorum disease.

Acknowledgments.—We thank Dr. N. Dobson, Ministry of Agriculture and Fisheries Veterinary Laboratory, New Haw, Weybridge ; the Lederle Laboratories Division, American Cyanamid Company, New York ; and Rijksserum Inrichting, Rotterdam, for the willingness with which they have placed the necessary stained antigens at our disposal for the carrying out of the whole blood tests.

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VARIATION IN DILUTER COMPOSITION AND ITS EFFECT ON THE FERTILITY OF BOVINE SEMEN

BY

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Stewart *et al.*, 1950, using a split sample method, found that there was no significant difference in the conception rate between semen diluted with 1 : 1 egg yolk citrate buffer and 1 : 3 egg yolk citrate buffer. Following this, Almquist, 1951, found no significant difference in the fertility of semen when diluted with egg yolk citrate buffer in ratios of 1 : 1, 1 : 3, 1 : 5 and 1 : 7 but Olds *et al.*, 1951, found a significant fall in conception rate using the 1 : 5 rates as compared with the 1 : 1 and 1 : 3.

Over the period October, 1951, to March, 1952, a controlled experiment was run at this centre in conjunction with the normal routine work in order to examine the effect of egg yolk citrate buffer solution in the proportion of 1 : 4 on semen fertility.

Semen was collected by the accepted method, by means of a short model artificial vagina, and was used for either one or two days. At the main centre semen was used on the day of collection but the same semen diluted and dispatched by rail to the sub-centres was used by them on the day following the collection.

After collection the semen was left to stand on the laboratory bench and allowed to cool to room temperature. It was then split into two equal portions. If two ejaculations were taken each was allowed to cool, after which they were mixed and the bulk then divided into equal parts. One part was diluted with diluter containing equal parts of egg yolk citrate buffer solution, the other with diluter consisting of egg yolk citrate buffer in the proportion of 1 : 4. Each half of the semen was diluted at the same rate which varied from 1 : 20 to 1 : 80 according to requirements. Each inseminator was provided with equal quantities of each sample and used them alternately on the first inseminations. By this means random sampling was best achieved and the numbers in each group kept reasonably parallel. Inseminations were carried out by the intrauterine technique. In all, eight bulls were used during the trial which lasted for six months and the inseminations were carried out by 22 men.

The results are expressed as a percentage of cows which were not reported for re-insemination within 12 weeks after the end of each month of the trial. The figures below show the sum total over the whole trial period.

Comparison of 1 : 1 with 1 : 4 Egg Yolk Buffer Solution

	Number of first inseminations		Percentage of non-returns at three months	
	1 : 1	1 : 4	1 : 1	1 : 4
Dartington :				
Allenhayes Dairy King	275	262	69·0	69·0
Allenhayes Recorder ...	514	511	73·2	75·2
Dartington Lumpy 6th	143	144	77·5	78·4
East Farm 76	396	391	73·4	73·8
Powderham Jasper 1st	324	349	74·0	74·7
Rydon Forester 165th ...	408	392	72·5	70·1
Sandwell Netherwood	232	239	78·4	68·2
Churston Lumpy 1st ...	195	204	68·7	72·5
	2,487	2,492	73·2	72·8
Sub-Centres :				
Allenhayes Dairy King	354	360	74·0	69·7
Allenhayes Recorder ...	620	617	74·8	76·2
Dartington Lumpy 6th	169	181	70·4	74·6
East Farm 76	443	438	74·9	72·6
Powderham Jasper 1st	424	421	74·5	72·9
Rydon Forester 165th ...	491	481	72·7	70·9
Sandwell Netherwood	271	269	74·2	69·5
Churston Lumpy 1st ...	249	246	71·1	65·0
	3,021	3,013	73·7	72·0
Total :				
Allenhayes Dairy King	629	622	71·8	69·4
Allenhayes Recorder ...	1,134	1,128	74·0	75·8
Dartington Lumpy 6th	312	325	73·7	76·3
East Farm 76	839	829	74·3	73·2
Powderham Jasper 1st	748	770	74·2	73·8
Rydon Forester 165th ...	899	873	72·6	70·4
Sandwell Netherwood	503	508	75·1	68·8
Churston Lumpy 1st ...	444	450	70·0	68·5
	5,508	5,505	73·5	72·3

Discussion

It is evident that there is no significant difference in the conception rate between the two groups, nor is there a significant difference between the two groups at either the main or sub-centres, so that the reduction in the proportion of egg yolk to 1 : 4 has no effect on the fertility of semen used up to two days old.

Summary

A split sample trial was run to examine the effect of reducing the proportion of egg yolk to citrate buffer to 1 : 4 in bull sperm diluter. No significant effect was found when compared with the usual 1 : 1 egg yolk buffer mixture.

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FOOT-AND-MOUTH DISEASE: A EUROPEAN COMMISSION

As was intimated in our issue of last week, delegates from 17 member countries of the Food and Agriculture Organisation, including Britain, met in Rome at the beginning of the month to discuss methods for the control of foot-and-mouth disease. They have agreed to submit to their Governments the draft constitution for a European foot-and-mouth disease commission. The constitution calls for a scale of contributions from members of the proposed commission, such as would enable the FAO to cover secretarial and administrative costs. Any surplus would be available for forming an emergency fund. The commission, it was stated, would concern itself with maintaining in different countries a register of stocks of vaccine and of the virus from which vaccine is produced, and with facilitating arrangements for joint action on storage and production. It would also assist in making supplies of vaccine and virus available in an emergency; study the possibility of establishing an international laboratory to deal with the classification of strains of virus and with vaccine production; and carry out research and other activities necessary if foot-and-mouth disease is to be completely eradicated from Europe.

CLINICAL COMMUNICATION

A COMPARISON OF THE OPERATION OF CAESAREAN SECTION IN THE BOVINE AND OVINE SPECIES

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Introduction

During recent years, due to the increase in the monetary value of the sheep, and enhanced value of wool, the hill-sheep farmer in particular has been persuaded to make far greater use of his veterinary surgeon in matters ovine. The result has been that, especially during the period from pre- to post-lambing time, the visits involving sheep practice continue to increase annually.

With special regard to lambing in this district, the breeds that one is chiefly concerned with include the Swaledale, Rough-Fell, Wensleydale, and crossed sheep resulting from inter-breeding of the aforementioned. During normal lambing times one usually finds that the average hill-sheep farmer, especially if he is endowed with small hands, is skilled at lambing his own flock ; in the horned breeds, however, if the lamb is a male particular skill is required by the operator if the lamb is to be delivered alive and the mother (especially if a shearling) survive, since the uterus is very easily damaged by the horns of the lamb.

Nowadays, because of the potential value of a good tup lamb (perhaps £25 to £45), the hill farmer will now bring his ewe to be lambed by his veterinary surgeon—so long as the latter can guarantee to save the ewe, and preferably both ewe and lamb or lambs. One finds that when an owner brings in his ewe for lambing, it is usually a difficult case (otherwise he would have lambed it himself) : such complications as a large tup lamb in a shearling ; undilated *os uteri* (ring-womb) ; dead lambs *in utero*, or trauma due to previous interference by the owner and/or his friends called in to assist. One always attempts to deliver these cases in the normal fashion, but often after a preliminary examination it is far better to resort to the operation of caesarean section.

As a note in passing, the operation also has been performed in this practice for the relief of " twin-lamb " disease, but to date results have been disappointing.

The writer is again fortunate in practising in a cattle-rearing area (chiefly Shorthorns) and hence encounters numerous parturition cases annually. Although, unlike the Friesian, the presence of abnormally large calves *in utero* is rare, one finds plenty of scope for performing caesarean section. I now consider that the day of extensive embryotomy has gone for ever since the operation can be carried out in an hour or less with far less strain on both patient and operator. One must decide, however, on surgical interference before the animal has been too weakened by continual attempts at delivering the calf in the normal way. Particular cases which will be described include operations carried out this year for removal of monster ; oversize ; dead, and a live calf prematurely.

Operative Technique in the Sheep

The operation has been performed in both the left and right flanks, and after due consideration one site seems to have little advantage over the other. With regard to the site of the incision, the writer is using the same site in both the sheep and the cow with very good results. In the sheep the incision is made in the hollow of the flank, commencing approximately 1½ inches below the transverse processes of the lumbar vertebrae, anterior to and just below the tuber coxae (Sisson), then dropping almost vertically down the flank for about 5 inches. (It is not quite parallel to the last rib but this may be used as a guide, incision being roughly 2½ inches posterior to it.) This incision is now always used by the operator and excellent results have been obtained —100 per cent. recovery rate in both sheep and lambs in 1952. Using this method there have been no breakdowns, wounds have all healed by first intention, and no subsequent prolapse reported to date.

Prior to the operation the ewe is given 2 dr. of chloral hydrate in ½ gill of water or milk *per os*. The animal is then laid on its right side (although as stated previously, one can operate on either flank) and an area of wool approximately 6 inches square is clipped off the flank. The wool is clipped with a pair of sheep shears in the form of a panel but remaining still attached to the rest of the fleece by its anterior edge (*i.e.*, to form a hinge) ; this panel of wool is fastened down to the rest of the fleece during the operation. On completion of the operation the panel is replaced over the clipped area and tied into its former place in the fleece. The reason for this is that it has been our practice to return the sheep home immediately after the operation and we find this a very efficient method of protection, in order to avoid injury to the site, since the animal may be walking about among heather, briars, etc. ; also to stop the animal getting cold.

The upper edge of the site to be clipped starts at the edge of the last rib, running back along the edges of the transverse processes of the lumbar vertebrae to the point of the hip (tuber coxae). Then all that area bounded by the above ; posterior edge of the last rib, and an imaginary line drawn from the point of the hip vertically down to the lower edge of the flank is clipped out. This area is shaved and cleansed with roccal (Bayer) in order to remove all grease from the skin. The animal is then propped up in the sitting position and 5 to 7 c.c. of 2 per cent. planocaine (M. & B.) injected into the sacro-coccygeal space ; followed by 5 to 10 c.c. into the line of incision subcutaneously, the patient now lying on its side again. The incision, approximately 4 to 5 inches long, is made through the skin in the position previously described. After freeing the skin from the subcutaneous tissues the operator picks up the latter with a pair of rat-tooth forceps and incises through into the abdominal cavity along the whole line of the incision. Usually one does not encounter any vessels which need ligaturing in the incision. Once the abdomen is open the gravid horn of the uterus is drawn up and forward through the incision. It should be drawn at least 4 inches through the incision, when it should completely occlude the aperture so that one is not troubled by omentum, or by intestine ballooning out.

The horn is next incised along its longitudinal axis for 4 or 5 inches, avoiding if possible any cotyledons which may be in the way ; the uterine wall and any cotyledons which are incised tend to bleed profusely at first but usually the haemorrhage soon stops of its own accord. The membranes, which by now are protruding from the uterus, are incised and the lamb or lambs drawn from the uterus and immediately handed to an assistant. The latter removes any membrane which may be adhering to the lamb and dries it as much as possible. The foetal membranes are never removed unless they come away with the foetus. In the past attempts have been made to remove the membranes *in toto*, but it has been found that the haemorrhage ensuing can be quite profuse ; also, the operation takes much longer even if the membranes can be separated from the cotyledons, and as

the shock seems to be more severe it is not now considered worth while or necessary to remove them. The small portion of the membranes attached round the incision, however, is cut away to facilitate the suturing of the uterine wall.

The uterus is sutured using a continuous Lembert type of stitch with fine cat-gut. Abdominal muscle and peritoneum are closed together, using six or seven mattress type sutures of medium cat-gut. The skin is closed the same way. In cases where the uterine contents have been found to be septic, oil-wax penicillin is inserted between each layer of sutures. The panel of wool is then pulled back over the clipped area and tied into its former place in the fleece.

Finally, 10 c.c. of black-leg anti-serum (B. W. & Co.) are injected intramuscularly.

Case Reports

(1) *Swaledale* (shearling). Operation on 23.4.52.

History.—Ewe brought to the surgery in the morning by the owner, who said that it was a week overdue, and that it had been attempting to lamb for the last two or three hours. The owner had examined the ewe himself and considered that the lamb was too big to be delivered normally.

Examination.—Revealed *os uteri* to be completely dilated ; foetal membranes ruptured. A live horned lamb lying in normal presentation position, but still completely anterior to the pelvis.

Procedure.—An attempt was made to deliver the lamb normally, but after some minutes, in view of the size of the lamb and danger of damage to the uterine wall, it was decided to operate while the ewe was still strong and the lamb alive.

Operation.—Carried out on the right flank. Live male lamb delivered. Foetal membranes not removed. Operation completed in 35 minutes ; ewe standing and lamb suckling half an hour after completion. Next morning the ewe had parted with the foetal membranes and both it and the lamb seemed strong. Temperature of ewe was 104·5° F., so 1 c.c. Mylipen (Glaxo) injected intramuscularly ; similar dose given the following day. Ewe and lamb, however, continued to feed and no further complications ensued. At present time both the ewe and lamb are in very good bodily condition.

(2) *Rough-Fell ewe* (two shear). Operation on 3.5.52.

History.—Ewe was examined on the farm, and although the animal was making attempts to lamb there was no external evidence of foetal membranes nor was any portion of the lamb to be seen. Owner said that the ewe was up to its time and had been attempting to lamb for the last two hours. In his opinion the animal had "no room." He also vouchsafed the information that the ewe had had difficulty in lambing a very big lamb in 1951.

Examination.—Vaginal investigation revealed that the *os* was only dilated sufficiently to allow one finger into the uterus. Foetal membranes were intact. Foetus alive. It was decided that this was a case of "ring-womb" (Harmar & Mount, 1951), so the animal was taken back to the surgery. It was re-examined several times throughout the rest of the day but the state of the *os* remained unchanged. Operation decided upon.

Operation.—Carried out on the left flank. Live female lamb delivered. Foetal membranes left *in utero*. Operation completed in three-quarters of an hour ; ewe grazing and lamb suckling three-quarters of an hour after operation. Ewe parted with foetal membranes during the night ; temperature normal next morning. Ewe and lamb returned home ; no further visits paid. Both animals still alive and in excellent condition.

(3) *Swaledale ewe* (shearling). Operation on 3.5.52.

History.—Animal brought to the surgery by the owner, who stated that it had been attempting to lamb for about two hours. He had evidently examined it because he said that the head and legs were back but that he had not been able to align them in the correct position for delivery.

Examination.—Revealed the presence of a large horned lamb completely anterior to the pelvis of the mother, with the forelegs tucked back under the abdomen and head lying back on the right flank.

Procedure.—Although the operator has an extremely small hand it was found impossible to turn the head into the forward position, primarily because there was not sufficient room even to place the hand in the uterus alongside the head. The membranes had ruptured and the uterine wall seemed to have contracted on to the body of the lamb. The lamb was alive and the ewe was in good condition ; hence it was decided to operate immediately.

Operation.—Carried out on the left flank. Live male lamb delivered. Foetal membranes not removed. Operation completed in 35 minutes. Ewe standing and lamb suckling two hours after the operation. Foetal membranes expelled about four hours later. Ewe and lamb returned home the following day, both in excellent condition ; no further visits paid. Both animals still alive and well.

Operative Technique in the Bovine

As in the sheep, the operation has been performed using different sites (Sutton, 1947), but the writer has come to the definite conclusion that the flank position is the best, and that the left flank is to be preferred to the right. A comparable site for the incision is used to that described previously in the sheep ; that in the cow being 12 inches long and practically vertical, commencing some 6 inches below the transverse processes of the lumbar vertebrae, and running 4 to 5 inches posterior to the last rib (see Photo. 1). It has been found that when one operates on the right flank there is always a great deal of inconvenience caused by the ileum in particular ballooning out through the incision, and this cannot be stopped until the uterus has been drawn into the incision sufficiently far completely to occlude the space. Again, when suturing the wound the intestine persists in protruding.

Photo. 1.—Showing site of incision in left flank; clipped area smaller than described.

Using the left flank incision no trouble has been encountered as yet from the intestines, rumen, omentum or mesentery protruding from the wound. The operation is always performed with the animal down and one usually finds, when the body cavity is opened, that the uterus is lying immediately below the wound. Also with the animal in the lying position, as opposed to the standing, as has been used, strain on the

operator is reduced greatly and the calf more easily delivered. The incision presents little difficulty in suturing, healing is usually rapid and to date no post-operative complications have been encountered except stitch abscesses. Operations carried out on both flanks using the same incision will be quoted in the case reports.

The subject is at first given 1 oz. chloral hydrate in a pint of water *per os* at least 30 minutes before one wishes to commence the actual operation. The animal is then cast using Reuff's method and the area of the flank between the last rib, transverse processes of the vertebrae and lower edge of the flank clipped and shaved. Next, the animal is pushed up into the sitting position with slight cant to the side of operation and 15 to 20 c.c. of 2 per cent. planocaine injected epidurally. While still in this position, planocaine is also injected into the recognised sites for inducing paravertebral anaesthesia as described by Wright. After a few moments the animal is allowed to resume the lying position and the site of operation cleansed, swabbed with roccal, and sterile cloths clipped round the area. Sufficiently large cloths must be used, small ones being worse than useless. 15 to 20 c.c. of planocaine are next injected along the intended line of incision subcutaneously and a further 15 to 20 c.c. intramuscularly.

The skin layer is opened along the whole length of the intended incision ; secondly, external oblique muscle and aponeurosis ; thirdly, internal oblique and, finally, peritoneum. In most cases the uterus will now be found immediately below the incision. The anterior extremity of the gravid cornu is drawn gently into the wound and through it for a distance of approximately 12 to 18 inches by using both hands placed beneath it. Assistants now push the animal into a semi-sitting position in order to avoid undue strain on the operator when he draws the calf from the uterus ; also any fluid in the organ tends to drain away outside the animal with minimum risk of seepage into the abdominal cavity. A sterile cloth can be placed between the uterus and body wall to absorb any material which may escape.

After the cornu has been drawn into the wound it is opened laterally as in the sheep, incision this time being from 10 to 18 inches, depending on the size of the foetus to be delivered. When incising the wall of the uterus one attempts to avoid the cotyledons. The foetal membranes, which now protrude from the uterus, are cut and the fluids allowed to drain away down the outside of the patient. Assuming that the calf is lying in the normal position of presentation, one usually finds that both hind legs are lying at the point of incision ; these are grasped firmly by an assistant, who commences to draw the calf very slowly out of the uterus. The operator meanwhile holds the edges of the uterine walls, and helps to assist the calf through the incision in the body wall as well as out of the uterus. If either incision seems to be too small to allow the calf through without tearing, it should be extended immediately.

Once the calf has been delivered, the opposite edges of the uterine wall are picked up with forceps so that the foetal membranes tend to fall back into the uterus. With an assistant still holding the forceps and applying slight traction to keep the now empty cornu exterior to the abdomen, the uterus is closed with eight or nine interrupted Lembert type sutures using coarse cat-gut. These sutures are further reinforced with a continuous Lembert suture, again using coarse cat-gut. This has been found to be especially necessary where a dead and decomposing foetus has been delivered. The wall of the uterus is finally cleansed with a clean swab soaked in roccal ; when a dead calf has been removed and contamination of the wound has occurred, oil-wax penicillin is run along the line of sutures. (One is always impressed with the rate at which the uterus contracts once the calf has been removed ; the incision has been observed to contract to half its original length before the second row of sutures have been inserted.) After cleansing, the organ is replaced in the abdomen. The patient is now allowed to fall back into the lying position.

The peritoneum and internal oblique are then picked up together and sutured with coarse cat-gut using interrupted Halstead type sutures. A special technique has been evolved when closing the peritoneum and muscle, by placing the sutures at least ½ inch away from the cut edges in order that there will be a lip projecting externally which can be picked up and incorporated in the next layer of sutures. (Fig. 1.) This strengthens the wound and cuts out dead-space between the different layers of muscles. Thus, the next layer which is sutured consists of external oblique muscle, connective tissue and the lip projecting from the internal oblique, interrupted mattress type sutures of coarse cat-gut again being used. After completing each layer of sutures oil-wax penicillin is applied along the line of stitches. Different methods of suturing the skin layer have been tried, using silk or tape mattress sutures and subcuticular nylon stitches. After due consideration, the last mentioned is recommended in view of the rapidity of healing and neatness of finish.

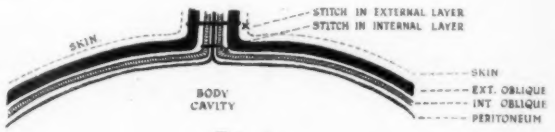

FIG. 1.

Immediately the operation has been completed the animal is supported in the sitting position ; it is visited frequently by the owner until it seems able to stand. Visits are paid by the operator for the next three consecutive days when the temperature and general condition are noted and the wound examined ; 2 c.c. of stilboestrol dipropionate are injected intramuscularly at each visit. In cases which appear to be in a weak state or suffering from shock after the operation rephrin (Bayer) has been used as a stimulant. In animals which have survived to date foetal membranes have been expelled within 48 hours after the operation. If the patient shows any tendency to have an elevated temperature, 3 c.c. of mylipen are injected intramuscularly daily for three to four days or until such time as the temperature returns to normal.

CASE REPORTS

(1) *Shorthorn heifer*, aged two years three months. Operated on 3.4.52.

History.—Increasing in bodily size over the last few weeks. A fortnight before the operation it was visited by my assistant, Mr. Wight, who found it to be literally almost like a barrel. Although not in very good bodily condition, the animal was still eating and appeared to be holding its own. Rectal examination was carried out and a tentative diagnosis made of twin calves or oedematous foetus. Animal was still eight weeks from full term. Owner was advised to contact us again if heifer showed signs of deteriorating in condition, which he did about two weeks later. Animal was now off its food and spending most of the time lying down.

Examination.—Temperature 100·5° F. Respiration laboured, faster than normal. Almost complete inappetence. Rectal examination not very satisfactory in that the uterus did not feel normal ; seemed very leathery and distended. Vaginal examination revealed presence of mucus plug in the cervix ; vagina felt very dry.

Diagnosis.—Oedematous calf.

Procedure.—With owner's permission it was decided to carry out caesarean section immediately. Since, on ballottement, the foetus

seemed to be lying on the right-hand side of the body cavity, and for experimental reasons, it was decided to operate in the right flank. As expected, a great deal of trouble was encountered with small intestine, especially as the uterus was such an enormous size and, because of this, taking some time to be manipulated through the incision. On incising the uterus, the head of a "monster" calf was presented. (See Photo. 2, taken the day following the operation.) The foetus was dead, but no putrefaction had taken place.

Photo. 2.—Calf (monster) described in Case 1.

Great difficulty was experienced in delivering the foetus, all incisions had to be extended at least 6 inches; when delivered, foetus was estimated to weigh between 90 and 100 lb. As shown in the photograph, it had the appearance of a small hippopotamus—small limbs and short tail, small ears but enormous head and body (the latter when incised was found to be solid, there being no evidence of oedema). The foetal membranes were in a very peculiar gelatinous state and a good deal of this was removed in the form of solid slabs from the uterus before closure. Operation was completed in two hours; silk mattress type sutures were used to close the skin. Sulphanilamide was dusted in between the skin and outer muscle layer. Heifer was left in sitting position, still unable to stand. Owner informed us later that the animal stood some four to five hours after the operation.

Next day the animal was found to be getting up and lying down normally; it had commenced to eat hay and calf gruel. Temperature normal; wound dry. On the second day, temperature was 105° F., so mylipen treatment was commenced; continued for next three days until temperature was normal. During this period, however, animal's appetite improved and cudding was observed. All this time there was a certain amount of foetid vaginal discharge but by the fifth day this was almost negligible. Animal was then left for eight days and 13 days after the operation the skin sutures were removed, two suture abscesses being observed. The heifer was found to be in excellent condition and galloped round the yard when turned out to water. This animal was sold for store purposes seven weeks later for £45, and when last seen on 21.8.52 was almost fit to grade for beef.

(2) *Shorthorn heifer*, two years old. Operated on 1.5.52.

History.—I was called to visit the above-mentioned in-calf heifer on 1.5.52. On arrival I was informed by the owner that the heifer was down and could not rise and that it was due to calve in about three weeks' time. He also said that it had not been doing well for some weeks and had finally reached the stage when it could not rise. It was eating a little hay and being given a bucket of calf porridge night and morning. In the owner's opinion it was bearing twin calves.

Examination.—Revealed heifer to be in very poor condition. Abdomen enormously distended. Eyes sunken in their sockets. Temperature 100·5° F., respiration normal. Membranes anaemic. Profuse diarrhoea (attributed to the gruel).

Diagnosis.—Heifer carrying twins or one very large calf and due to the youth of the animal, proving too much for it to bear and maintain its own bodily condition. Heifer did not appear as if it would survive very much longer.

Procedure.—Owner informed that if the calf was removed there was a very faint chance that the heifer might survive. Operation of caesarean section was commenced immediately on the left flank. A very large, live bull calf lying in the normal presentation position was delivered. Foetal membranes left *in situ*. Animal was left in a fairly comfortable state sitting up; 4 c.c. rephrin injected intramuscularly. Animal had a drink of water and a little hay some hours later. The next day, however, it died, some 24 hours after the operation. Calf was graded for veal a week later.

(3) *Crossed Friesian-Shorthorn heifer*, two years six months. Operated on 21.7.52.

History.—I was called to the farm at 2 o'clock on the morning of 21.7.52 and informed that the animal had been attempting to calve since midnight. The heifer, which was up to time that day, had been served by a Friesian bull and the calf was grossly oversized. When the animal had commenced to calve the head had not been presented with the forelegs but the owner had managed to bring it forward with the aid of a crook.

Examination.—On arrival, the head, forelegs and thorax were found external to the vulva. Owner and assistants, however, had not been able to pull the calf, which was now dead, any farther. (It was alive when heifer commenced to calve.) Animal was lying on its left side in a very distressed condition and straining continuously. A vaginal examination was made and I was convinced that the pelvis of the calf would not pass through that of the heifer. In fact, I suggested that the pelvis of the heifer might already be damaged following the pressure that had been applied. Vulva and cervix were found to be very badly torn.

Procedure.—A caesarean operation was decided on. Meanwhile, the head, forelegs and thorax were cut away and the abdomen eviscerated. The operation in this case was carried out on the right flank, again for experimental reasons, and an enormous amount of trouble was experienced with small intestine ballooning out until sufficient of the cornu had been drawn into the wound to obliterate the cavity. A great deal of difficulty was also experienced in drawing the uterus into the wound, since the gravid cornu was lying on the opposite side of the abdomen. The uterus was also very difficult to manipulate (due to the fact that the fore end of the calf had been drawn through the pelvis of the dam and was being held in this position by the cervix). All incisions had to be extended 2 inches before the hind portion could be drawn from the uterus. Membranes were left *in situ*. The heifer was left at 6 a.m. in a fairly comfortable state; it was visited again at 6 p.m. same day. Owner said that it had had a drink of water but would not eat; it had been attempting to stand, but was unable to support itself. It had been straining slightly all day. Temperature was normal; 2 c.c. stilboestrol dipropionate and 4 c.c. rephrin injected intramuscularly.

22.7.52. Heifer visited at 5 p.m., still down and straining occasionally. Again had been attempting to stand. Foetal membranes had been expelled. Animal had taken gruel and eaten a little hay. Temperature 104°. Vulva and vagina very bruised and inflamed; 3 c.c. mylipen and 1 c.c. stilboestrol injected.

23.7.52. Animal still down, although the owner on his own initiative had lifted it with slings; it had not been able to support itself, however. Still eating and drinking a little. Temperature 104°. Straining now and again. Animal had diarrhoea, but this was put down to the liquid diet; 3 c.c. mylipen and 3 c.c. rephrin injected.

24.7.52. Heifer in same state as previous day but seemed weaker. Temperature 102°. Had ceased to strain; 3 c.c. mylipen injected.

25.7.52. Heifer died at 1 p.m.

(4) *Shorthorn heifer*, two years; operated on 7.8.52.

History.—Animal examined 6.8.52, when the owner said that he had noticed it in the field trying to calve. (It had run with the bull, but he thought that it would be somewhere near full term.) He had carried out an examination himself, but had been able to insert only two fingers into the vulva, discovering the presence there of the head of a dead and rotting foetus.

Examination.—Confirmed the owner's findings; calf seemed to have been dead for some time. The vagina was very dry and there

seemed to be no possibility of delivering the calf normally. Temperature 102° F. Appetite poor.

Procedure.—It was arranged to perform a caesarean operation on the following afternoon. Carried out in the left flank ; a dead and decomposing full-term male calf removed. From the state of the calf it appeared to have been dead for at least four or five days. There was about ½ gallon of stinking watery material in the uterus, and to prevent this leaking into the abdomen during the operation, the latter was carried out with the animal in the sitting position for most of the time. The foetid material in the uterus was mopped out with cotton wool (most of the foetal membranes which remained came away with the calf). After the uterus had been swabbed out, 5 to 6 oz. of sulphanilamide powder were dropped in before suturing. Intramammary penicillin was also applied along the uterine sutures, before the reinforcing continuous Lembert suture was inserted.

As each layer of the abdomen was closed, at least 2 × 100,000 units of penicillin were applied. In this case the skin was closed using the continuous subcuticular stitch. This animal proceeded to make a surprising recovery in view of the state of the calf when removed. (This animal is depicted in Photo. 3, taken 14 days after the operation.)

Photo. 3.—Case 4.

The day following the operation it was prepared to eat everything given to it, and it was turned out to graze for an hour or two. Temperature was 102°. There was a stinking vaginal discharge ; hence 2 c.c. stilboestrol were injected each day for three days, by which time it had become negligible. Animal continued to eat well and thrive. Temperature at no time rose above or fell below 102° F.

Summary

1. The operation of caesarean section is described as carried out on the sheep and the cow, using identical sites and technique. In the cow, however, the optimum site is in the left flank.

2. The site used (in the cow especially) seems to be definitely superior to the lateral sites of incision.

3. Animals are always operated on in the recumbent position, for ease of operation and to reduce strain on the operator.

4. A similar type of anaesthesia is used in both species, but reinforced with paravertebral in the cow.

5. Foetal membranes are always left *in situ* in both species.

6. Using this method, shock is very rarely encountered.

7. Post-operative complications involving the wound have been almost negligible.

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ABSTRACTS

Effect of Aureomycin on Diarrhoea and on Vitamin B_{12} and Methionine Needs of the Pig*

One of the authors and his associates had earlier reported (Cunha, T. J., *et al.*, 1949, *Arch. Biochem.* **23.** 510–512) that the addition of a feed supplement containing aureomycin and vitamin B_{12} to a maize-peanut meal ration dispensed with the necessity of a methionine supplement.

In the current experiments, the growth rate of weanling pigs receiving a basal diet comprising ground yellow maize (56·5 per cent.), peanut meal (41·5 per cent.), minerals (2 per cent.) and synthetic vitamins was improved by the addition of either vitamin B_{12} or of methionine, but the effect was not additive, *i.e.*, the earlier findings were confirmed. Growth was markedly improved by the addition of aureomycin to the basal ration, but here again the further addition of methionine did not produce any supplementary response. The further addition of vitamin B_{12}, however, did enhance the response to aureomycin.

A diarrhoea, characterised by soft pasty faeces, occurred periodically in all groups except those receiving aureomycin. Pigs receiving aureomycin had also smoother coats and more "bloom."

A. N. W.

* **Effect of Aureomycin on Diarrhoea and on Vitamin B_{12} and Methionine Needs of the Pig.** Sewell, Cunha, Shawver, *et al.* (1952.) *Amer. J. vet. Res.* **13.** 186-187.

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Time and Site of Insemination in Cattle*

In only about 60 per cent. of cows does the oestrus cycle fall between 17 and 25 days, and the chances of conception appear to be less in those cows with shorter or longer cycles. The highest conception rates are obtained when cows are inseminated from the middle to the end of oestrus, and reasonably good results follow when insemination is carried out within six hours after oestrus. Fertility increases and the danger of breeding troubles decreases as the interval between calving and mating is extended. A rest of about 60 days after calving before mating is recommended, for although a uterus returns to normal size, shape and tone by about 30 days after calving, another 30 days are required before the endometrium becomes normal.

The vaginal deposition of semen results in a conception rate 40 per cent. lower than cervical deposition, and it appears that 0·2 ml. of semen in the cervix is as effective as 4 ml. deposited in the vagina. The rectovaginal technique shows about 10 per cent. better conception than the speculum method. Recent evidence indicates that sperm are transported from the cervix to the ovarian ends of the oviducts of cows in less than 2·5 minutes. This rapid transport takes place with living or dead sperm, after natural or artificial insemination, and whether or not the cow is in heat. For this reason deep deposition of semen is unnecessary, and comparable conception rates have been obtained by mid-cervical, uterine and cornual insemination by the rectovaginal technique. In a final analysis mid-cervical insemination is recommended for routine artificial insemination, for the technique is comparatively easy, and there is less danger of causing uterine infections, a decreased possibility of transmitting brucellosis and a diminished danger of interrupting a pregnancy.

J. O. L. K.

* **Time and Site of Insemination in Cattle.** Vandemark, N. L. *Cornell Veterinarian.* **42.** 215-222.

Interval Between the Time of Ovulation and Attachment of the Bovine Embryo*

The following facts were collected after the slaughter of 18 cows and heifers of mixed beef breeds, following controlled service.

The attachment of the chorio-allantoic membrane to the material cotyledons is a gradual process which takes place over several weeks, attachment first taking place immediately around the embryo. Thirty-three days after ovulation attachment is made between maternal and foetal tissues, although only at the 35th day is it probable that the placental confluence is complete. Chorionic placental plates appear at 30 days near the embryo, at 35 days in the body of the uterus, and only at 38 days in the non-gravid horn. At 32 days the allantoic sac completely fills the chorionic sac in the gravid horn, but requires about 37 days to fill the chorionic sac in the non-gravid horn.

F. R. B.

* **The Interval between the Time of Ovulation and Attachment of the Bovine Embryo.** MELTON, A. A., BERRY, R. O., & BUTLER, O. D. (1951.) *J. Anim. Sci.* **10.** 993.

REPORT

[Bechuanaland Protectorate. 1951 Annual Report by the Director of Veterinary Services (J. E. R. Roe, M.R.C.V.S.)]

This report stresses that the shortage of professional staff was keenly felt having regard to the size of the Protectorate, with a little over 1,000,000 cattle, about 200,000 sheep and 475,000 goats scattered over a wide area. The shortage of staff had become aggravated by the need for three veterinary officers being employed mainly in the careful examination for disease of about 77,000 slaughter cattle exported by rail from 17 loading points. About half were sent south to Johannesburg abattoir and the remainder north to be distributed to Southern and Northern Rhodesia and the Belgian Congo. In addition, a veterinary officer frequently had to make a journey of 400 miles to supervise cattle originating from Ngamiland in the north-west which were ferried across the Zambesi at Kazangula to Northern Rhodesia. The demand for meat in the adjoining territories is increasing and has led to a considerable increase in the price in the Protectorate and also has increased the revenue.

In consequence of the need to supervise the export trade in livestock, veterinary officers had to curtail their touring away from the railway line which is so essential because without personal contact with the primitive stock owners of the different tribes to win their confidence and to supervise junior staff, propaganda on disease control, improved methods of animal husbandry, animal products, marketing and grazing control cannot be carried out effectively.

However, it is to be hoped that the request for an increase in the establishment by three veterinary officers and one livestock officer will be granted. Also, when the Colonial Development Corporation abattoir at Lobatsi and its ranches in the north start operating, staff tied up along the railway line will be released for more general duties.

The Protectorate is indeed fortunate in being free from the main cattle scourges of so many other African territories, such as rinderpest and contagious bovine pleuropneumonia. Foot-and-mouth disease, which had given so much trouble in the past, did not occur in 1951, and a comprehensive scheme for its control has been worked out to implement decisions of the Inter-Territorial Foot-and-Mouth Disease Conference ; the capital expenditure of £144,000 is to be found by a contribution of £85,000 from the cattle export levy and the balance from the colonial development and welfare fund.

Anthrax and blackquarter are widespread and take a heavy toll among unvaccinated stock. Contagious abortion is also widespread but its insidious consequences are not generally recognised by stock owners and little has been done to bring it under control. Rabies is endemic in the northern Protectorate, but with the shooting of mad dogs many cases are not confirmed. A small number of doses of avianised vaccine (U.S.A.) was purchased from Southern Rhodesia and used to inoculate 229 dogs. One of the inoculated dogs developed rabies four months later.

Trypanosomiasis is prevalent in Ngamiland and the Chobe district and apparently is spreading westward from the swamps. So far, only *G. morsitans* has been identified. No treatment other than of cattle intended for export has been attempted. Of the tick-borne diseases, heartwater is responsible for a mortality among small animals and cattle when moved on to endemic grazing.

Botulism is reported to be responsible for a high mortality throughout the Protectorate. A heavy mortality among calves from under feeding, paratyphoid and internal parasites is recorded and, if the figure of 70,000 shown as the reduction in the calf population on the previous year is correct, calf management requires most urgent attention.

Drought conditions obtained during the latter part of the year. The need for a wider distribution of watering places is emphasised, both along stock routes and in grazing areas to prevent serious damage to pasture land in their vicinity.

This is on the whole a disquieting report which emphasises the urgent need for an increase in staff and money to tackle the many problems. Also, it must be most discouraging to all working under such handicaps.

H. H.-B.

IN PARLIAMENT

Protection of Wild Birds

In the House of Lords on December 2nd Viscount TEMPLEWOOD called attention to the need for better protection of wild birds. At present their protection was dealt with in 15 separate Acts and 250 regulations: there was wide divergence in the regulations made by local authorities. His second objection to the present arrangements was the inadequacy of the penalties for killing birds on the prohibited list; they were quite derisory.

The Government should make the legislation a great deal more simple. A draft Bill was being prepared by Lord Ilchester's committee on the protection of wild birds. Any Bill should start not so much with a list of birds that could not be killed, but with a list of birds that could be killed. It should contain a general prohibition as a basis, but there should be exempted categories for pests, like crows and magpies, and semi-game birds, like ducks and geese. He would like to see certain changes in the game laws. The close season for partridges should start on December 1st.

If the Government could not introduce a Bill this session, there were plenty of private members in both Houses who would be willing to do it.

The EARL OF ILCHESTER said that his committee recommended that a proposed new Bill should provide all-round protection for birds and far larger fines than were imposed now; and special protection for rare birds, of which there would be a schedule in the Bill, and their eggs. There should be no protection for harmful birds, and edible birds, such as ducks, geese, and waders, should be allowed to be shot at any other time than at close times.

Under the Bill all wild birds would be protected but there would be provisions allowing for the shooting of birds which were harmful to agriculture and forestry. Regulations for groups of counties

Continued on page 826

Memorial to the late Harry Steele-Bodger

As was announced in our last issue, the British Veterinary Association has inaugurated a fund to endow a memorial to the late Harry Steele-Bodger, President during the years 1939–41, and Chairman of the Survey Committee 1939–46. The Memorial will take the form of a Travelling Scholarship for Veterinary Surgeons.

It is hoped that all members of the profession will give their generous support in memory of one who, with his colleagues, did so much to further the aims and aspirations of the veterinary profession and to extend veterinary practice in its widest sense to each and every farm in the country.

The fund is open to all—both within and without the profession—who would wish to pay tribute to the late Harry Steele-Bodger's work for the profession, for agriculture and for the country.

His colleagues within the profession will be aware of the tremendous effect of the war-time endeavours which he so ably and so tirelessly led.

Those in agriculture will be aware of the lasting benefit of that closer association with the profession forged by those endeavours and of the benefits which have accrued.

Organisations, societies, business interests and individuals outside the profession who may wish to lend their support will be welcomed as subscribers to the memorial.

The members of the Appeal Committee are :—

The Officers of the Association :—
Mr. A. M. Graham, President,
Mr. A. J. Wright, Senior Vice-President,
Mr. A. Thomson, Junior Vice-President,
Mr. H. E. Bywater, Hon. Treasurer, B.V.A.,
Mr. H. F. Hebeler, Hon. Secretary, B.V.A.,
Mr. F. Knight, General Secretary, B.V.A.,

Mr. G. N. Gould, Chairman,
Dr. R. Lovell, Vice-Chairman,
Mr. S. L. Hignett, Hon. Treasurer,
Mr. R. F. Armour,
Mr. E. P. Barrett,
Miss W. M. Brancker,
Mr. J. A. Brown,
Professor T. G. Browne,
Dr. H. G. Lamont,
Dr. R. F. Montgomerie,
Miss Rosa Smith, Hon. Secretary,

together with some other veterinary surgeons, known to the above Executive Committee as friends of the late Harry Steele-Bodger, who have been invited to join the Committee.

All donations should be sent to the Hon. Treasurer of the Appeal Committee :—

S. L. Hignett,
Steele-Bodger Memorial Fund,
British Veterinary Association,
36, Gordon Square,
London, W.C.1,

and cheques, postal orders, etc., should be made payable to the "Steele-Bodger Memorial Fund."

The first list of subscribers will be published in the December 20th issue of *The Veterinary Record*, and supplementary lists will be inserted from time to time.

would be co-ordinated which would prevent the situation which Lord Templewood had described. Other matters to be dealt with would include the provision of more bird sanctuaries, the possession or importation of live and dead birds, rules for taxidermists including the possession of eggs or egg shells, the methods of taking or pursuing birds, the powers of the police, and the exceptions which could be made for scientific purposes. He would prefer it to be a Government Bill but it might pass more quickly as a private Bill. Because of the delay and his infirmity he began to doubt whether he would be "in at the kill," but he hoped the House would push the Bill forward.

After further debate, in which the injury done to bird life by oil pollution at sea was referred to by Lord Samuel as an important aspect of the subject, Lord Lloyd, Under-Secretary, Home Office, said he did not think sea birds came within the scope of any Bill which might be introduced on this subject. The matter was being looked into by a committee set up by the Ministry of Transport to enquire into the dumping of oil in the sea.

The need for effective measures for the protection of wild birds was becoming greater with modern times. It was agreed that the present law was most untidy, difficult for the public to comprehend, and for the responsible authorities to enforce. There was a steadily growing opinion that the law did not go far enough, and that the time had come for a general advance in the direction of a more comprehensive protection. There was almost complete unanimity about what should be done to put the evil right. It would be achieved if the present principles of protection were reversed, and all birds were protected except for certain harmful birds and certain edible birds whose killing would be confined to a season.

The advisory committee's proposals reached the Home Secretary in September, 1951, and were considered with some care. There had been an interval, but no delay. Publication of the committee's proposals would not be possible because for 30 years the advice which these committees had given to the Home Secretary had always been confidential and had never been published. The Home Secretary and the Secretary of State for Scotland had found themselves in complete sympathy with the general objects and tenor of the proposals of the two committees concerned. There were several questions—for instance the degree of protection to be given to birds' eggs—which raised problems of some difficulty. Modified proposals had been drawn up and the heads of a Bill prepared for discussion with the advisory committee. Afterwards the modified proposals would be discussed with the nature conservancy, local authority associations and other interested bodies, and a Bill would be drafted. If, owing to pressure of Government business, it could not be made a Government Bill, it could be introduced by a private member with the Government's blessing.

The further consultations would take a little time. There was no possibility of introducing a measure this season, but the Home Secretary was hopeful that the Bill might be ready for next session, if time could be found for it.

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QUESTIONS

Animals (Veterinary Treatment)

Mr. Peter Freeman (December 4th) asked the Minister of Agriculture whether he has considered the Report of his Departmental Committee on Licences, in reference to the issue of licences under Section 7 of the Veterinary Surgeons Act; and what action he proposes to take in the matter to restrict the number of people permitted to give treatment to animals and perform minor operations.

Sir T. Dugdale: I assume that the hon. Member is referring to the Report of the Committee, under the chairmanship of the hon. Member for Derbyshire, South-East (Mr. Champion) set up to advise me on problems raised by certain applications for licences under Section 7 of the Veterinary Surgeons Act, 1948. I have accepted the recommendations of the Committee and am in touch with the animal welfare societies concerned with regard to their implementation particularly the recommendation relating to the employment of veterinary surgeons part-time.

Mr. Freeman: Will the right hon. Gentleman confirm that no action taken under his regulations will in any way place a restriction upon people at any time helping sick or injured animals or birds when it is within their means or power to do so?

Sir T. Dugdale: I must have notice of that question.

Mr. Collick: Can the Minister explain the reason for the delay since the Report was made to him?

Sir T. Dugdale: The Report was published some months ago and we have since had consultations with various bodies. The Report is now public property. I have accepted its recommendations, and there has not been any undue delay.

Mr. Harold Davies: Might not the treatment of animals by unqualified people be eliminated if the Government established a national veterinary service which would enable the small farmer to obtain qualified services?

Sir T. Dugdale: That is another question.

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Foot-and-Mouth Disease

Mr. Hurd (December 4th) asked the Minister of Agriculture if the Departmental Committee reviewing foot-and-mouth disease policy has started to take evidence from farmers, veterinary surgeons and others; and whether the committee will investigate the policies pursued by other countries in Europe and South America.

Sir T. Dugdale: Yes, Sir. The committee has already held nine meetings and is taking evidence from farmers, veterinary surgeons and others. It is investigating the policies adopted by European countries and countries on the American Continents.

Mr. Hurd: Will members of the committee be able to visit places like Holland and Denmark, who have rather similar problems to our own?

Sir T. Dugdale: Yes, Sir. I understand that they will visit various European countries, probably including France, Switzerland, Western Germany, Holland, Denmark, Sweden, and, very likely, Argentina.

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Anthrax

Mr. Crouch (December 4th) asked the Minister of Agriculture the results of recent research into the cause of anthrax and its prevention.

Sir T. Dugdale: It is known that anthrax is caused by the specific organism *bacillus anthracis*. Research work has resulted in the production of satisfactory vaccine for the protection of livestock; this vaccine is being made availabie to veterinary surgeons.

The special enquiries into sources of infection and possible further safeguards, to which I referred in the reply I gave to my hon. Friend the Member for Newbury (Mr. Hurd) on October 30th, are still in progress.

Mr. Crouch asked the Minister of Agriculture if he will trace the origin of the outbreaks of anthrax during the last six months.

Sir T. Dugdale: As the reply contains a table of figures I will, with permission, circulate it in the Official Report.

Mr. Crouch: Is my right hon. Friend not alarmed at the increase that has occurred in the outbreaks of anthrax during the last few months? Further, is it correct that farmers do not get compensation for animals that die as a result of anthrax?

Sir T. Dugdale: I am certainly very concerned about the increase in this disease during the past year. Perhaps my hon. Friend will put down a Question in respect of the second part of his supplementary question.

Following is the reply:

Outbreaks of Anthrax, June to November, 1952

June	31
July	90
August	123
September	170
October	185
November	209

Mr. P. Wells asked the Minister of Agriculture whether, in view of the serious increase in anthrax, especially among pigs, he will make anthrax vaccine more readily available to farmers.

Sir T. Dugdale: I am arranging for the vaccine to be made available generally to veterinary surgeons for use at their discretion. It is not proposed to allow farmers to purchase the vaccine direct, since it is important that it should be administered under veterinary advice.

Mr. G. Wilson asked the Minister of Agriculture if he is aware of the recent increase in cases of anthrax; and if he is satisfied that all necessary precautions are being taken to prevent outbreaks of anthrax in livestock causing danger to human beings.

Sir T. Dugdale: Yes, Sir. The main danger arises from contact with the blood or other infected material from animals which have died of anthrax. Elaborate precautions are taken to ensure the safe disposal of infected carcases and material.

Mr. Wilson: Is my right hon. Friend aware that his answer will give considerable satisfaction to a number of people who have been expressing anxiety on the subject?

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Horses (Transport)

Mr. Peyton (December 4th) asked the Minister of Agriculture if he is now satisfied that the present regulations governing the transportation of horses in the United Kingdom provide adequate

safeguards against cruelty; and that such regulations are fully and sufficiently enforced.

Sir T. DUGDALE: Yes, Sir, in respect of Great Britain. My responsibility does not extend to Northern Ireland.

Mr. PEYTON: Would my right hon. Friend watch this matter with great care, as it has given rise to considerable public concern?

Sir T. DUGDALE: Yes, Sir, certainly.

Mr. G. JEGER: Is the Minister satisfied that he will be able to watch all the things he has promised to watch if he cuts down his staff, as suggested by some of his hon. Friends?

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NEW FOREST PONIES (SLAUGHTER)

Mr. BESWICK (December 4th) asked the Minister of Agriculture if he will introduce legislation to prevent the breeding and rearing of ponies in the New Forest for the purpose of sale and subsequent slaughter for human consumption.

Sir T. DUGDALE: No, Sir. I do not think that this is necessary. There is no reason for thinking that New Forest ponies are, in general, bred and reared with the intention of selling them for slaughter.

Mr. BESWICK: Does the Minister realise that he gives the impression of being very complacent about this matter? Is he aware that there is widespread public feeling against this repulsive trade being furthered by the use of these common lands for the breeding and rearing of ponies? Will he at least see that unweaned foals are not sold for this purpose?

Sir T. DUGDALE: There is no evidence to show that New Forest ponies are being bought for slaughter. Their numbers have to be kept down, and they are sold normally from time to time.

Mr. NICHOLSON: Is my right hon. Friend saying that the only New Forest ponies sold for slaughter are those which it is necessary to destroy to reduce the pony population? Is not he aware that there is this trade going on, which surely is of a repulsive nature?

Sir T. DUGDALE: If the number of ponies in the New Forest were not kept down there would be great suffering caused to other ponies owing to the shortage of winter keep.

Mr. BESWICK: Cannot the Minister keep down the pony population by other methods? Is he aware that I can give him the names of people who have had to buy unweaned foals to save them from getting into the hands of horse meat traders?

Sir T. DUGDALE: I do not think that that would meet the case.

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CATTLE QUARANTINE STATION, GLASGOW

Mr. P. ROBERTS (December 4th) asked the Minister of Agriculture if he will authorise reasonable expenditure to enable the enlarging of the cattle quarantine station at Glasgow, in order to be in a position to obtain over £250,000 worth of dollar export as soon as the foot-and-mouth disease ban is lifted on cattle exportable to North America.

Sir T. DUGDALE: Yes. We have now received information that the Canadian authorities will require all livestock to pass through quarantine when the ban is lifted, and I am arranging for work on the enlargement of the Glasgow station to be put in hand immediately.

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FOOD AND AGRICULTURE (CO-ORDINATING MINISTER)

Lieut.-Colonel LIPTON (December 2nd) asked the Prime Minister whether he has yet come to a decision on the future supervision of the Ministers of Food and Agriculture by a co-ordinating Minister.

The PRIME MINISTER: I have no statement to make on this matter at the present time.

Lieut.-Colonel LIPTON: While it is appreciated that the Prime Minister must still feel his way on this as on many other matters, is he able to say whether or not this principle of over-lordship is now in the course of being abandoned?

The PRIME MINISTER: I did not use the expression "over-lordship." I thought it was connected with an operation in the late war, but it has been used a great deal in a very foolish manner. As was explained by the Leader of the Opposition, he managed to do all these things without telling the public anything about them.

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VETERINARY AND REMOUNT ESTABLISHMENTS

Colonel GOMME-DUNCAN (December 2nd) asked the Secretary of State for War why, according to the Army Estimates, 1952-53, 93 clerical and industrial staff are to be employed at Veterinary and Remount Establishments, while no provision is made for technical staff in those establishments.

Mr. HEAD: Apart from two of this staff who are employed on technical duties, the technical staff is provided by the Royal Army Veterinary Corps.

PIGS (SLAUGHTER)

Mr. STEWARD (December 1st) asked the Minister of Food if he will give urgent consideration to pigs belonging to farmers, club members, cottagers and small holders, killed on the owners' premises, being given the protection of the Slaughter of Animals Act.

Major LLOYD GEORGE: Legislation would be necessary to apply the Slaughter of Animals Act to animals killed on farms. A notice attached to every application for a self-supplier's licence to slaughter draws attention to the desirability of ensuring that animals are slaughtered under humane conditions.

NOTES AND NEWS

Diary of Events

Dec. 17th.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at 1, Wimpole Street, W.1., 5 p.m.

Dec. 18th.—Meeting of the East Midlands Division, B.V.A., at Sutton Bonington, 2.15 p.m.

Dec. 19th.—Meeting of the Sussex Division, B.V.A., at Brighton (The Old Ship Hotel), 2.30 p.m.

Dec. 19th.—Meeting of the Biochemical Society, St. Bartholomew's Hospital, E.C.1, 2 p.m.

Jan. 2nd.—Meeting of the Association of Veterinary Teachers and Research Workers, at the Royal Veterinary College, N.W.1, 11 a.m.

Jan. 7th.—Meeting of the R.A.V.C. Division, B.V.A., in the Lecture Theatre of the Zoological Society's Gardens, Regent's Park, London, 12 noon.

Jan. 9th, 1953.—Dumfries and Galloway Division, B.V.A., Ladies' Guild: Annual Dance in aid of the V.V.B.F., at Dumfries (Cairndale Hotel). (See Notice.)

Feb. 27th.—Annual Ball of the Veterinary Society, Faculty of Veterinary Science, The University, Liverpool, to be held in the Students' Union from 8.0 p.m. to 2.0 a.m.

COUNCIL AND COMMITTEE MEETINGS OF THE B.V.A.

The following arrangements for the Council and Committee meetings of the B.V.A. in January, April and July of 1953, have been made by Council B.V.A.:—

January 14th, 15th and 16th in London.
April 29th, 30th and May 1st in Edinburgh.
July 29th, 30th and 31st in London.

The times of the various meetings will be published in due course.

The next quarterly meetings will be held in London on January 14th, 15th and 16th, 1953, in the following order:—

Wednesday, January 14th.—11 a.m., Home Appointments Committee; 12 noon, Parliamentary and Public Relations Committee; 2.30 p.m., Organising Committee.

Thursday, January 15th.—10 a.m., Veterinary State Medicine Committee; 12 noon, Finance Sub-committee; 2.30 p.m., General Purposes and Finance Committee.

Friday, January 16th.—11 a.m., Council Meeting.

R.C.V.S. COUNCIL AND COMMITTEE MEETINGS

The next series of meetings will be held in London on February 4th, 5th and 6th (Council).

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A Survey of Animal Mycoses

The notable advances in medical mycology during recent years have not been accompanied by similar progress in the veterinary field, where there is little reliable information on the incidence and importance of even such widespread, common and well-established mycoses as ringworm and avian aspergillosis.

A recent survey of human ringworm in this country by Walker (1) showed that approximately one quarter of the infections in man were caused by the so-called "animal" species of dermatophytes; that is to say, by fungi believed to have originated from animals. Allowing for the spread of infection from man to man, this would still suggest a large reservoir of infected animals, particularly cats, dogs and cattle. There has been no comparable survey of ringworm in these animals, however, and there are few mycologically satisfactory records of the disease.

Fungi are frequently found associated with other pathological conditions, but their identity, and whether they are present as saprophytes or parasites, is not always clear. As in human medicine the

facts suggest that fungi merit consideration in any disease of uncertain etiology.

In order to obtain information which might help to elucidate the part played by fungi as the cause of disease in animals, the Agricultural Research Council is sponsoring a survey of the fungi found associated with pathological conditions in farm and domestic animals. The mycological aspects of the survey are being undertaken by Dr. G. C. Ainsworth and Mr. P. K. C. Austwick at University College, Exeter, and so far the material has been collected mainly by veterinary investigation officers stationed at the Veterinary Investigation Centres throughout the country. The co-operation of all veterinary practitioners who may be interested is now invited.

The main objective of the survey is to find out what fungi are involved and to assess the frequency of their occurrence, in the hope that the data will suggest future investigations in both veterinary science and mycology. Infected material from cases in which fungal infection is known or suspected, and cultures of fungi isolated from such cases would, therefore, be most welcome.

Skin scrapings or infected hairs travel well if merely folded in a piece of clean notepaper and placed in an envelope. Diseased tissue should be securely packed in watertight jars. Cultures are of greatest value when the name of the medium is stated. Much of the interest of the survey depends on the details of case histories and it is hoped that these will be made as complete as possible.

Material should be sent to:—

Dr. G. C. Ainsworth,
A.R.C. Survey,
Hatherly Laboratories, University College,
Prince of Wales Road,
Exeter, Devon,

from whom further details can be obtained.

Every specimen will be acknowledged and a report made to the sender as soon as possible.

It should be emphasised that a diagnostic service is not being offered, and although every effort is made to send a report in time for it to be clinically useful, this is not always possible.

(1) *Brit. J. Derm. Syph.* **62**: 239-51, 1950.

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PERSONAL

Forthcoming Marriage.—HALL—ALLIN.—The engagement is announced between Mr. John Hamilton Hall, B.SC., M.R.C.V.S., eldest son of Mr. E. B. D. Hall, M.R.C.V.S., and Mrs. Hall, of Wiveliscombe, Somerset, and Gwynedd Mary Allin, only daughter of Mr. and Mrs. A. L. Allin, of Wiveliscombe, Somerset.

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Death.—SHEATHER.—Suddenly at her home in Chorleywood, Maud, for 44 years the beloved wife of Dr. A. Sheather. At her special request no letters.

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JACK MOTTON

VETERINARIAN, GENTLEMAN AND FRIEND

These three words sum up in brief the make-up of a man who was taken from our midst in the twinkling of an eye. How sad for all of us left to mourn him but how kind for him and just what he would have desired.

There are many who can pay tribute to him far better than I and at this moment it is difficult to collect one's thoughts adequately to do him justice.

It must be some 35 years ago that I first met S. J. Motton and during all that period I never knew him to utter an angry word nor to get at all ruffled. Pull one's leg he would and enjoy doing so, but it was all in fun which both sides could relish.

It was I who was the cause of him becoming Hon. Secretary of the Western Counties Division of the B.V.A. Owing to the sudden death of Mr. W. S. Stableforth, I found myself landed with the appointment of Hon. Secretary in addition to that of Hon. Treasurer. After six years of this, I found the two jobs too much and looked around for someone to take on part of the work. We were in London together for Council meeting and I brought up the subject, telling him he could manage the work of Secretary, as there was nothing to it. The reply was, if there is not much work to do, why do you want to give the job up? However, I managed to persuade him to accept the post and how well he did it for almost 22 years.

It was from now on that I really got to know Motton, as no meeting of the Western Counties was arranged without our having joint discussion.

His dry wit carried him through everything and if he was asked an awkward question and he did not wish to commit himself, it always stood him in good stead and silenced everyone.

He was born in Penzance, being the eldest son of the late Mr. S. J. Motton, who was superintendent of the Western Union Cable Company. He served his pupilage in Penzance and then went to the Royal Veterinary College, London, where in 1908 he qualified. Six years later he became a Fellow.

He served on the staff of the Camden Town College for a time and then returned to Penzance to join the firm of Messrs. J. Stephens and R. Glave Saunders. In the 1914-18 war he rose to be a Captain in the Royal Army Veterinary Corps. He was a member of Council of the R.C.V.S. from 1942 to 1949, an examiner from 1925 to 1940 and again from 1951 up to the time of his death. In addition, he was a member of the Royal Society of Medicine and amongst the many appointments he held were with the Ministry of Agriculture and Fisheries, National Master Farriers' Association, Penzance and District Agricultural Association and St. Ives and District Canine Society.

I asked Jack Motton many times why he did not slow up a bit, as it was obvious that he did far too much work and at times it told on him. His reply always was, "I cannot go slow, work is my hobby and I must carry on until the end," which he did and was happy to do so.

Only a week before his passing I had a talk with him on the telephone, the conversation being interrupted at times by his parrot, as was nearly always the case.

How we shall miss his usual cheery Christmas Letter, which he used to send around to his friends, full of fun and wit and always topical.

The "Western Counties" will not seem the same without Jack Motton, but all will have to do their best to keep it up to the high standard to which he raised it: we must not let him down.

He leaves a widow, a most charming person, for whom all feel the very deepest sympathy, an only brother, Mr. W. F. Motton, a dental surgeon in Penzance, and a cousin, Mr. W. H. Motton.

R. B. N.

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FURTHER TRIBUTES

There can be few veterinary surgeons in practice who have had such a lasting influence on the careers of their young associates as Mr. S. J. Motton. None of these, I am sure, would fail to acknowledge with deep gratitude the inspiration and confidence which he imparted to them. I was fortunate to see practice with him as a student and my case record book is still a revelation of his careful gathering together of data with a view to accurate diagnosis and rational treatment. Mr. Motton spared no pains in explaining his findings and encouraged frank discussion of his problem cases. As has already been said, he was a great reader of the current veterinary literature and was profoundly interested in modern research activities.

His ready wit and natural humour made the work of the day, which was usually a long one, anything but tedious and it was remarkable how inexhaustible his energy seemed to be.

He never failed to send his seasonal greeting to all his friends and the character of his message was truly marked by his originality. With the passing of Motton and some of his contemporaries, all too prematurely, one may say "The old order changeth. . . ."

S. J. E.

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From Streatley, the first stage of the Christmas finals, we wish to express our sorrow in the loss of a very dear and respected colleague, who was to have travelled with us on this panel.

Not only was Jack Motton our senior in years and in experience, having acted as examiner to the R.C.V.S. for 16 years, but he was also a fountain of wisdom and wise counsel in moments of difficulty.

All of us knew him in his work, in his home and in his rare moments of leisure, when he was truly the good companion. In addition to a multitude of friends throughout the whole country, the profession will join with us in mourning the departure of one of its greatest and most revered practitioners.

H. G. LAMONT,
R. H. SMYTHE,
A. MCLEAN,
GEO. EATON.

The Funeral

Gulval Church was filled for the memorial service, on Friday, December 6th, conducted by the Vicar, Canon C. H. S. Buckley.

At the close of the service the congregation stood in silence while Canon Buckley himself played Chopin's "Marche Funebre."

Canon Buckley, in his address, said: "We are not paying a tribute of a mere form of respect for one who gave so much of his life to public service, but we are making our personal tribute to a friend and one who has endeared himself to us by the very giving of his own personality and life."

John Motton, he said, was a man full of tender sympathy that made his work not only brilliant, but also made it a vocation and calling. He was one of the most eminent exponents of his profession in his day.

Family mourners were Mr. and Mrs. W. D. Motton, brother and sister-in-law; Mr. L. M. Chapman, father-in-law; Captain G. W. A.

Jarrett, O.B.E., brother-in-law, also representing Mrs. Jarrett; Miss Jessie Motton, cousin; Miss E. Motton, Mrs. J. O. Coutts, representing Mr. W. H. Motton, cousin; Mr. Baldwin Jenkin, cousin.

Others present were Miss E. R. Parker, M.R.C.V.S., partner; Mr. H. J. D. Neil, M.R.C.V.S., partner, also representing Mrs. Neil and the Glasgow Veterinary College; Lieut.-Colonel B. C. M. Edmonds, M.R.C.V.S., partner, also representing Brig. G. A. Kelly, C.B., Colonel-Commandant, Officers and other ranks, and the Old Comrades Association, Royal Army Veterinary Corps, and Mr. J. T. Sheriffs, M.R.C.V.S.

Members of Staff: Mr. Frank Richards, Mr. J. D. Rogers (Dan) and Mrs. Rogers, Mr. and Mrs. Gordon Tonkin, Miss Rogers, and Mrs. F. M. Sleeman. Mr. A. R. Smythe, F.R.C.V.S., D.V.S.M., also representing President and Council, the Royal College of Veterinary Surgeons, and Mr. R. H. Smythe, M.R.C.V.S., Nottingham, and Dr. F. R. Bell, M.R.C.V.S.; Mr. L. E. Perkins, M.R.C.VS., Divisional Veterinary Officer, Ministry of Agriculture, also representing the Ministry of Agriculture, the President, Mr. A. M. Graham, M.R.C.V.S., British Veterinary Association, and Mr. A. Thomson, M.R.C.V.S., Vice-President, British Veterinary Association; Mr. R. H. Phillips, representing Mr. R. L. Phillips, F.R.C.V.S., Loughborough; Mr. C. S. Head, M.C., M.R.C.V.S; Mr. A. Cook, M.R.C.V.S., Veterinary Officer, Ministry of Agriculture, also representing Captain G. Atkinson, M.R.C.V.S., Superintendent Veterinary Officer, Ministry of Agriculture, and Mr. J. Forbes, M.R.C.V.S., Truro, and Ministry of Agriculture Veterinary Officers in Cornwall; Mr. P. H. Hobbs, M.B.E., M.R.C.V.S., Mr. P. Fisher, M.R.C.V.S., representing the Western Counties Veterinary Association; Mr. and Mrs. Masson, also representing Messrs. Masson and Dall, MS.R.C.V.S., Torquay; Mr. H. G. L. Harvey, M.R.C.V.S., and Mr. J. D. Dunn, M.R.C.V.S., representing the Western Counties Veterinary Association; Mr. H. W. Townson, M.R.C.VS.; Inspector T. Munnelly, R.S.P.C.A.; Lieut.-Colonel E. H. W. Bolitho, Lord Lieutenant of Cornwall; Comdr. Bolitho, also representing Captain J. B. Sparrow, Master of the Western Hunt; Dr. and Mrs. W. Leslie, also representing the Medical Staff of the West Cornwall Hospital; Dr. and Mrs. Greenwood Penny; Dr. and Mrs. J. A. Reid; Major and Mrs. Lyster; Captain R. E. Goodman, also representing Mrs. Goodman, also Superintendents and Commanding Officers, Trinity House Service; Mr. R. J. Oliver, also representing Mr. K. J. Oliver; Mr. J. Laity, also representing Mr. H. Laity and Penzance Agricultural Association; Mr. H. Lanyon, representing the South-Western Electricity Board; Mr. W. J. Stevens, representing the Penzance Branch of the National Master Farrier's Association; Mr. A. E. J. Coxen, Manager of Penzance Midland Bank; Mr. J. G. Longmore, representing Barclay's Bank and also Mr. F. G. Thomas; Mr. A. O. Kernick representing Lloyd's Bank; Mr. J. S. Page representing Mr. H. Hartley Thomas, Manager Cornishman Newspaper Company; Mr. J. H. Coughlan, Station Superintendent Western Union Telegraph Company; Mr. G. Roberts representing Messrs. Boots, Chemical, Managerial, Field and Research Staff; Mr. S. Hichens, representing the Penzance Operatic Society; Mr. R. E. Warburton, Meat Inspector; Mr. J. Uren, also representing Messrs. F. R. Uren and Sons; Mr. W. G. T. Harvey, representing Messrs. Harvey and Bailey; Mr. J. Rogers, representing the Premier Garage, Penzance; Mr. W. Weymouth, representing Messrs. T. F. Hosking, Penzance; Mr. and Mrs. R. B. Harvey, also representing Messrs. Harvey and Robinson, Penzance; Mr. M. Lawrey, representing Messrs. F. Lawrey and Son; Police Sergeants W. H. Treloar, J. Hancock and C. Kendall, also representing Chief Inspector C. H. Brown, Penzance; Alderman and Mrs. W. H. Lane, also representing Alderman T. T. Lane; Mr. and Mrs. J. H. Radbourne, representing the Penzance Chamber of Commerce.

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FOG CASUALTIES AT SMITHFIELD SHOW

Approximately 2 per cent. of the total cattle entries were affected by the unfortunate clash of a "London particular" with the arrival at Smithfield of entries for the show. Before the exhibition was opened eight animals were slaughtered at the request of their owners and three more died from respiratory troubles. Others received veterinary treatment. Sheep and pigs in the stock lines, where about 1,200 animals were penned, appeared not to have been so distressed by the atmosphere. In spite of this setback all else gave promise of a successful show, the breed societies having made a special effort to demonstrate early maturing qualities.

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Weekly Wisdom

That ("working party") seems to be a peculiar expression which has recently come into use; these parties seem to have no executive powers. They do not work at all, they merely talk.—Mr. Justice Vaisey.

FOWL PEST

Shortly after we went to press with our issue of last week, the Ministry of Agriculture announced that a large outbreak of fowl pest had been confirmed near Halifax and that there was reason to fear that there had been "a fairly widespread dispersal of infection through movement of infected poultry." Full justification for the warning was forthcoming almost immediately in reports of confirmed outbreaks in many counties. Writing towards the middle of the week the position is that 43 counties have been affected this year, the number of outbreaks being 322; and the number of birds slaughtered is approximately 205,000, the compensation value being about £240,000.

In a recent announcement the Ministry of Agriculture and Fisheries states that considerable progress has been made in the work of tracing and examining poultry connected with the original outbreak, but it is highly probable that further outbreaks will come to light in the course of the remaining enquiries.

"In the present situation it is most important that all poultry keepers should strictly observe the regulation which makes it an offence to send away live poultry from premises on to which any live poultry had been moved during the preceding 28 days. The purpose of this regulation is to limit the spread of fowl pest through movements of poultry and the Ministry is hopeful that its strict observance by all concerned may make more stringent regulations unnecessary. The Ministry will, of course, continue to watch the situation closely from day to day."

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax:

Argyll.—Drumalea Farm, Kilkenzie, Argyll (Dec. 3rd).

Cheshire.—Landfields Farm, Ledsham, Wirral; Hall Moss Farm, Bramhall (Dec. 1st); Legh Oaks Farm, High Legh, Knutsford (Dec. 4th).

Cornwall.—Battery Park, Polruan, Fowey (Dec. 2nd).

Devon.—Kerswell Barton, Broadclyst, Exeter (Dec. 2nd).

Derbys.—Knotbury Lee Farm, Quarnford, Buxton (Nov. 28th); Woodside Farm, Middleton-by-Youlgreave, Bakewell (Dec. 3rd).

Dorset.—St. Andrew's Piggeries, Bedchester, Shaftesbury (Nov. 28th).

Dumfriesshire.—Kirkblane Farm, Caerlaverock, Dumfries (Dec. 2nd).

Essex.—Langham House, London Road, Wickford (Dec. 3rd).

Glos.—Nestley Farm, Tetbury (Dec. 2nd).

Hants.—Upham House, Upham, Southampton (Dec. 3rd).

Herts.—Castle Farm, Lea Valley, Wheathampstead (Dec. 4th).

Kent.—Home Farm, March Side, Chislet, Canterbury (Nov. 28th).

Lancs.—Larbreck House Farm, Larbreck, Great Eccleston, Preston (Nov. 29th); New Home Farm, Goosnargh, Preston (Dec. 1st); Moorside Farm, Woodplumpton, Preston (Dec. 2nd); Hodgson Manor Farm, Waddington, Clitheroe (Dec. 4th).

Norfolk.—Wood Farm and Beckham Farm, Upper Sheringham (Nov. 28th); Sunderland Farm, Docking, King's Lynn (Dec. 2nd).

Oxon.—Meadow Farm, Buckland Road, Bampton (Dec. 2nd).

Somerset.—Charlton Farm, Wraxall, Bristol (Dec. 4th).

Staffs.—Upper Woolaston Farm, Church Eaton, Stafford (Nov. 28th); Preston Barn, Penkridge, Stafford (Dec. 2nd).

Suffolk.—Tower Bungalow, Owl's Green, Dennington (Dec. 3rd).

Surrey.—Barnwell Court Farm, Chessington (Dec. 4th).

Sussex.—Pococks Gate Farm, Frant, Tunbridge Wells (Dec. 3rd).

Warwicks.—Grange Close, Little Shrewley, Hatton (Dec. 3rd).

Wilts.—High Pen Farm, Calne; Hull Farm, Horsington, Temple Coombe (Nov. 28th).

Worcs.—Oldfield Farm, Ombersley (Dec. 3rd).

Yorks (W.R.).—Cliffe House Farm, Fellbeck, Pateley Bridge (Dec. 2nd).

Fowl Pest:

Beds.—13, Stratford Road, Sandy (Dec. 1st); 3, Park Road, Kempston, Bedford (Dec. 3rd).

Brecon.—Cromcamlais Isaf, Sennybridge (Dec. 4th).

Bucks.—Harkaway, Risborough Road, Stoke Mandeville, Aylesbury (Dec. 3rd).

Cheshire.—58, Argyle Road, Cheadle (Nov. 28th); Manley House Farm, Manley, Warrington (Dec. 4th).

Derbys.—Stubley Farm, Dronfield, Woodhouse (Dec. 2nd).

Devon.—Rex Lea Poultry Farm, Canada Hill, East Ogwell, Newton Abbot (Dec. 4th).

Essex.—The Gloster, Hunters' Chase, Hutton, Brentwood (Nov. 28th); Birches, Hunters' Chase, Hutton, Brentwood (Dec. 2nd).

Lancs.—Chipping House Farm, Chipping, Preston (Nov. 29th); Rose View, Cabus, Garstang, Preston (Dec. 2nd).

Leics.—Elm Farm, Arnesby, Leicester; Home Farm, Saddington; 2, Harcourt Street, Market Harborough (Dec. 2nd); 162, Hermitage Road, Whitewick (Dec. 4th).

Lincs.—Ivy Cottage, Easton-on-the-Hill, Stamford (Nov. 28th); Main Street, Thornton Curtis, Ulceby (Dec. 1st); Caistor Road, Market Rasen (Dec. 2nd); Ings Farm, Scramblesby, Louth; The Bungalow, High Street, Blyton; Overdene, Main Road, Fotherby, Louth (Dec. 3rd); Wain Grove Farm, Fulstow, Louth (Dec. 4th).

Norfolk.—Bamber's Lane, Emneth, Wisbech (Dec. 4th).

Northants.—Mill Farm and 15, High Street, Raunds, Wellingborough; Tristan, West Street, Kingscliffe, Peterborough (Dec. 1st); Hillside, Lowick, Kettering; The Bungalow, Woodford, Kettering; Hillside, Barton Road, Barton Seagrave, Kettering (Dec. 2nd); 4, Butts Road, Raunds, Wellingborough (Dec. 4th).

Notts.—Trinity College Farm, Barnby Moor, Retford (Dec. 28th); Meadow Farm, Kirkington, Newark (Dec. 1st); Whitelands Farm, Cotgrave, Nottingham (Dec. 2nd); 252 and 415, High Road, Chilwell, Beeston (Dec. 4th).

Radnors.—Church House Farm, Beguildy, Knighton, Radnor (Dec. 4th).

Staffs.—19, Valley View, Brownhill, Walsall; 63, Wissage Road, Lichfield (Dec. 1st); 51, Wissage Road, Lichfield (Dec. 4th).

Sussex.—Hazeldine, Horsebridge, Hailsham (Dec. 3rd).

Surrey.—Ward Farm, Felbridge, East Grinstead (Dec. 4th).

Yorks (E.R.).—Near Marsh Farm, Ottringham, Hull (Dec. 4th).

Yorks (W.R.).—Mytholmroyd, Halifax (Dec. 28th); Stocks Farm, Midgeley, Halifax (Dec. 1st); The Vicarage, Denton, Ilkley (Dec. 4th).

SWINE FEVER:

Beds.—Wood End Farm, Pertenhall, Bedford (Dec. 5th).

Berks.—Oaktree House, Forest Road, Binfield, Bracknell (Dec. 3rd).

Bucks.—Frogmore Farm, Saunderton, Princes Risborough (Dec. 6th).

Denbighs.—Bryn Golen, Saron, Denbigh (Dec. 4th).

Lancs.—King Street Stables, King Street, Hulme, Manchester, 15 (Dec. 4th).

Lincs.—Red Leas Farm, N. Cockerington, Louth (Dec. 1st); North Street, Market Rasen (Dec. 4th); Hook End Farm, Tetney, Grimsby (Dec. 5th).

Suffolk.—"The Shop," The Street, Melton, Woodbridge (Dec. 4th).

Yorks (W.R.).—Old Well House, Low Staithes, Summerbridge, Harrogate (Dec. 1st).

Wigtownshire.—West Challock, Dunragit, Stranraer (Dec. 1st).

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Foot-and-Mouth Disease in Jersey.—On Tuesday last an outbreak was confirmed on a farm at St. Mary's.

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Errata [Abstracts *Vet. Rec.* **64**].—"*Virus* (psittacosis—related?) causing a pneumonia in sheep," p. 756, *for* "mice" in the last sentence *read* "calves"; "Vaccinations against Johne's disease," p. 804, col. 1, line 12, *for* "the controls" *read* "the vaccinated sheep"; "Curare in veterinary surgery," p. 805, col. 1, line 2, *for* "in either anaesthesia" *read* "in ether anaesthesia."

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

"WARFARIN" POISONING IN THE DOG

Sir,—I was privileged to have a discussion on "Warfarin" (3-(alphaacetonylbenzyl)-4-hydoxycoumarin) with K. P. Link and his colleagues at the Wisconsin Alumni Research Foundation, Madison, U.S.A., about a year ago. Link, of course, discovered the cause of sweet clover disease in cattle and "Warfarin" was the logical outcome of his work.

The question of toxic effects of "Warfarin" to dogs, cats and other domestic animals had been very fully considered by the Foundation and by other authorities in the United States and the general consensus of opinion was that the compound has a wide margin of safety. This is because poisoning usually results only from repeated ingestion over several days, because the cereal baits used are not very attractive to dogs and cats, and because the toxic doses for domestic animals are generally considerably in excess of those lethal to rats and mice.

Nevertheless, officials of the U.S. Wildlife Service, who, incidentally, are enthusiastic users of "Warfarin," told me that a small number of dogs and cats had been poisoned during the initial field trials preparatory to the general introduction of the product. They also made the point that pigs are quite highly susceptible although sheep and poultry seldom or never appear to be affected. Experiments had shown that whereas 2½ lb. of "Warfarin" bait given daily for five days killed pigs, sheep showed no visible signs of toxicity after receiving the equivalent of 40 lb. of bait daily for the same period of time. There is thus undoubtedly a marked species difference in toxicity. H. J. Spencer, of the U.S. Wildlife Service research laboratories, is in agreement with this view; he regards lethal dose levels for cats as 5 mg. per kg. and for dogs and pigs as 20 to 25 mg. per kg. He believes further that there are marked differences in individual susceptibilities in dogs.

Link has been interested for some time in the possibility of toxic effects arising in dogs and cats from their eating rats and mice poisoned by "Warfarin." His experience and that of many others in America is that such "secondary" poisoning cannot arise from the ingestion of a single carcase but may do so if the diet consists of nothing else for 4 to 10 days. This, of course, is quite possible on rat or mouse infested premises where "Warfarin" treatment makes the rodents easy prey. Several cases where it had actually occurred in field usage were brought to my attention.

A well-recognised advantage of "Warfarin" is that its toxic effects can be neutralised by vitamin K_1. Here again, however, some qualification is necessary. Vitamin K_1 certainly specifically counteracts the effects of "Warfarin" but it does so relatively slowly and if repeated doses of "Warfarin" are being received at high levels it may not be able wholly to restore the situation. It has been the experience of a number of American veterinarians that vitamin K_1 alone cannot always be relied upon to save dogs or cats poisoned with "Warfarin" when administration has been delayed until after the symptoms are well established. Such cases may well respond, however, to whole blood transfusion where this is possible.

"Warfarin" is outstanding as a rodenticide and there is no reason why, with reasonable precautions, its use should not be free from the distressing fatalities which accompany the laying down of strychnine, phosphorus and other acutely toxic baits. Even if ingestion has occurred to quite a considerable extent there is usually little danger to domestic animals provided the period of intake is not prolonged and veterinary assistance is promptly obtained.—Yours faithfully, D. D. OGILVIE, "Corbiere," King's Road, Sale, Cheshire. *November 27th*, 1952.

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MIGRANT BIRDS AS VECTORS OF FOOT-AND-MOUTH VIRUS

Sir,—A number of articles have recently appeared in the veterinary press on the subject of migrant birds as vectors of foot-and-mouth virus. To the uninitiated, or even to the amateur ornithologist, the views expressed have carried conviction. But it should be realised that professional ornithologists are up in arms* against these pronouncements; they maintain that much of the data used is out of date, and doubt the conclusions drawn even from these data. They also observe, cogently, that ornithologists would not attempt to pronounce publicly on matters veterinary without consultation with and approval by veterinarians—Yours faithfully, PAUL CROSFIELD, Chipping Norton, Oxon. *November 30th*, 1952.

* Personal communication from Librarian to Earl Grey Institute of Ornithology, and Editor of "British Birds,"; see also letter to *The Times* from Philip Brown, the Secretary of the Royal Society for the Protection of Birds.

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PARALYSIS IN SIAMESE CATS

Sir,—Apropos the letter on this subject from Mr. Humphreys, it is a fact that the only cases of feline paraplegia which have occurred in this practice during the last year or two, have been in Siamese cats. One, examined a month ago, was carefully palpated for any kind of traumatism, and was also radiographed; but no cause could be discovered. I prescribed an eggspoonful of cod liver oil, and 5 grains di-calcium phosphate daily. The owner now reports great improvement.

The Siamese does seem to be more prone to *osteogenesis imperfecta* than other breeds, and as a result is more susceptible to pathological fractures. If your correspondent, and others interested, would refer to my "Index of Diagnosis," they will find these conditions discussed at some length on pages 241, 295 and 401 of the third edition.

From my personal experience I would say that the Siamese cat is rather more susceptible to contract disease than are the other breeds: thus the popular conception, that they are delicate, is probably right.—Yours faithfully, H. KIRK, "Croyland," 658, Finchley Road, Golders Green, N.W.11. *December 6th*, 1952.